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A REPORT

ON THE

Bihar Earthquake and on the measures taken in consequence thereof up to the 31st December 1934

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W. B. BRETT C.I.E., I.C.S.
Relief Commissioner, Bihar and Orissa.

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A portion of the Muzaffarpur Bazar.

PREFACE.

UNLESS the contrary is stated, the figures in this report refer to the 31st of December 1934.

Acknowledgments are made to Mr. H. E. Ormerod and to Captain R. A. B. Cooper, O.B.E., who have kindly furnished photographs which are reproduced in the report.

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A Report on the Bihar Earthquake and on the measures taken in consequence thereof up to the 31st December 1934.

CHAPTER I.

Description of the area affected by the earthquake.

A short description of the area in which the earthquake occurred is prefaced to this report, because the physical configuration of the country had a marked influence, not only on the immediate situation caused by the shock, but also on the measures which were taken to remedy the damage.

The Tirhut, Patna and Bhagalpur divisions of Bihar and Orissa occupy the lowest section of the Gangetic plain, before it merges in the delta of Bengal. From east to west, this tract is about 220 miles in length. At its western end the plain is nearly 200 miles wide; to the east, the north-easterly trend of the Chota Nagpur hills, which form its southern boundary, causes it to contract to a width of less than 100 miles.

The Tirhut division.

2. The river Ganges flowing from west to east divides the plain into two portions. The northern portion is an oblong block 220 miles long from west to east, and 80 to 90 miles in width. Its western half is the Tirhut division, with its administrative headquarters at Muzaffarpur, composed of the four districts of Champaran, Saran, Muzaffarpur and Darbhanga. The country consists entirely of alluvial soil, composed chiefly of loam and layers of water-bearing sand, of unknown, and probably immense depth. The surface slopes gently to the south-east. Motihari is 217 feet above sea level, while the country round Rosera, a hundred miles to the south-east, is only 62 feet lower.

The river-system of Tirhut must be described, since it affected the operations considerably. The Gandak river issues from the Himalayas at the north-west corner of the division and flows in a straight line south-east, until it joins the Ganges opposite Patna.

It separates Saran from the rest of the division. It is unfordable, and is nowhere bridged except at its mouth, where it is spanned by the railway bridge and foot bridge at Hajipur. Another railway bridge, at Bagaha in the extreme north-west of Champaran, was destroyed by flood in 1928 and was not replaced. Though the Gandak flows through the division for 140 miles, it is thus nowhere passable for wheeled road traffic without the use of boats, and is only crossed by rail at one point. A smaller river, the Bur Gandak, follows a very winding but roughly parallel course about thirty miles to the north-east. A similar river, the Bagmati, follows a circuitous course further to the north-east and joins the Bur Gandak at the extreme south-east of the division, after receiving the water of a number of smaller streams which flow southward from Nepal across the Darbhanga district. These rivers all flow in beds which are higher than the surrounding country. Between them lie areas of low-lying ground, occupying former channels of the rivers. Most of these areas, locally known as " chaurs ", are cultivated with rice. Others form marshes, too wet to be cultivated, or small lakes. The rivers thus divide Tirhut into four tracts; the Saran district; the area south-west of the Bur Gandak river; the basin of the Bur Gandak and Bagmati systems; and the country beyond these rivers to the north-east. Saran is a self-contained area with easy internal communications, but with bad communications with the east and north-east. In the second of these tracts, the principal towns (from west to east) are Motihari, the headquarters of the Champaran district, Muzaffarpur and Samastipur. These all lie close to the south bank of the Bur Gandak river, and are connected by a *first class road and a railway running parallel to the road. There is another first class road, 32 miles long, and a railway, parallel to it, connecting Muzaffarpur and Hajipur, and so linking up this area with Patna. The third tract contains no towns. In the fourth tract are Darbhanga, the headquarters of the district of that name, Sitamarhi and Madhubani. In order to reach Darbhanga (40 miles east of Muzaffarpur), Sitamarhi (37 miles north of Muzaffarpur) and Madhubani (25 miles north of Darbhanga), it is necessary to cross the courses of the Bur Gandak and Bagmati rivers. The railway crosses these rivers at one point only, between Samastipur and Darbhanga. There are, however, three first class roads by which vehicles can reach the tract north-east of the Bagmati. One follows the railway from Samastipur to Darbhanga. Another road runs direct from Muzaffarpur to Darbhanga. The third runs due north from Muzaffarpur to Sitamarhi. All three roads are heavily

* A first class road in Tirhut is embanked and bridged, but not necessarily metalled.

embanked, with numerous screw pile and masonry bridges and causeways. They are liable to suffer severe damage from floods, and once they are breached, it is usually impossible to make diversions until the water subsides. As the epicentral tract of the earthquake lay in the country north-east of the Bagmati, the interruption of communications across the Bagmati and Bur Gandak basins was a central difficulty of the relief operations.

Tirhut is an entirely agricultural tract, and one of the most fertile parts of India. Its population of $10\frac{3}{4}$ million averages 830 persons to the square mile. The principal crop is winter rice, particularly in the northern portions; but valuable crops of tobacco, chillies and other special crops are raised. Of late years, the cultivation of sugar-cane has assumed a preponderating importance. 97 per cent of the population of Tirhut live in villages, of which there are 14,000, containing about 2 million houses. Usually there are in each village a few masonry houses, but the great bulk of the cultivators live either in simple houses with mud walls and thatched or tiled roofs, or in huts of even lighter construction with walls of bamboo lattice work plastered with clay. The towns are essentially centres for marketing agricultural produce and supplying goods to the surrounding country. The population is never urban in character, but has its roots in the villages. Only 303,000 persons live in the towns, occupying about 60,000 houses. The largest town is Darbhanga, with 60,000 inhabitants. Muzaffarpur contains 43,000 inhabitants and Chapra 47,000, but the other towns are smaller. Their population varies from 10,000 to 20,000 inhabitants.

Purnea and North Bhagalpur.

3. The eastern portion of North Bihar is less fertile and more sparsely populated than Tirhut. Much of it is occupied by the numerous branches of the Kosi river, and a tract entirely devoid of roads lies between Supaul, in North Bhagalpur, and the Purnea district, which occupies the extreme east. The only towns of any importance are Purnea and Katihar. There are small towns, which are subdivisional headquarters, at Supaul, Araria, Kishungunj, Beguserai and Madhipura.

South Bihar.

4. The third tract, South Bihar, is the country between the Ganges and the hills of the Chota Nagpur plateau. It is also alluvial in character, but the alluvium is chiefly clay and the emergence of rock at various points quite close to the Ganges indicates that its depth is not great. As the damage done in this area consisted almost entirely of damage to buildings, it is unnecessary to describe the river system or the lines of communication. With the exception of Gaya, which lies among rocky hills sixty miles south of the river, the principal towns, Patna, Monghyr,

Bhagalpur and Arrah lie on, or in close proximity to the Ganges. Patna, the capital of the province, and its suburb, Dinapur, contain nearly 200,000 inhabitants, whose 40,000 houses stretch in a long ribbon of buildings for many miles along the Ganges opposite to its confluence with the Gandak. Monghyr, a city of 53,000 inhabitants, occupies a peninsula jutting northward into the Ganges and backed by rocky hills, a hundred miles east of Patna, while Bhagalpur with 84,000 inhabitants is near the Ganges, 35 miles further to the east. These towns are of a more urban character than the towns of North Bihar. Though they contain many houses built of mud, the proportion of masonry houses is higher than in North Bihar and large buildings are more frequent. The country-side, though not so thickly populated as Tirhut, is closely cultivated and mud houses of a substantial type predominate in the villages.

CHAPTER II.

The Earthquake.

5. The main shock occurred at 2-13 P.M. on the 15th of January. The middle of January is the coldest time of the year in Bihar. A very cold west wind had been blowing that day. A rumbling sound, similar to that caused by the passage of heavy lorries, was heard for a few seconds before the shock was felt. The shock itself lasted for a period which varied between two and a half and five minutes in different places. There seem to have been two stages, with a lull of a few seconds between them. Observers stated that most of the damage occurred early in the second stage.

Fissuring of the soil.

6. In the worst areas, the shaking of the earth was so severe that people could not stand up and were compelled to sit or lie on the ground. In the open country, the undulations could be seen distinctly. These surface waves averaged about six inches in height, with a wave length of between six and twelve feet. In and near the central regions of the earthquake, one of the most spectacular results of the violent oscillation of the alluvial soil was the ejection of sand and water. The compression of the soil caused it to open up into fissures, sometimes several hundred yards in length, and from them poured great quantities of water heavily charged with fine sand. It is difficult to obtain accurate information of the width of these fissures. They opened and closed and were obscured by the gushing of the water, but authentic instances have been recorded in which human beings and animals were temporarily imprisoned in a closing fissure, while there were cases in which carts and motor cars sank into the soil and had to be dug out. It is improbable that any of the fissures, after the first few seconds, were more than forty or fifty feet deep.

Along the banks of rivers, lakes and tanks, fissuring of a somewhat different type occurred. Here blocks of soil, finding insufficient support on one side, tended to slide away and slump down. In a number of places, level ground on the edges of lakes broke away and great slabs of earth sank bodily as much as ten feet below the old surface and lay tilted at various angles. Where this type of fissuring occurred, the fissures did not close up after the earthquake and often remained several feet wide and ten or twelve feet deep.

A third type of surface disturbance was the formation of geysers. Sand and water spouted up, often to a height of six feet. These geysers usually appeared after the shock had stopped and continued to play for some time after the final tremors had ceased to be felt. They left conical mounds of sand and small crater-like openings, but as a rule did not eject as much sand as the fissures. The behaviour of wells was particularly noticeable. Being in direct connection with the sub-soil layers of water-bearing sand, they ejected sand and water with explosive force and after the earthquake were left filled almost to the surface with sand.

The effect of the oscillations on embankments was to cause them to sink into the earth. In some cases they were displaced laterally, so that a straight railway embankment or road assumed a twisted shape.

The water which was ejected from the fissures flowed into large shallow lakes which inundated many square miles of country and formed an impediment to agriculture and to communications for several weeks after the earthquake.

Rivers and bridges.

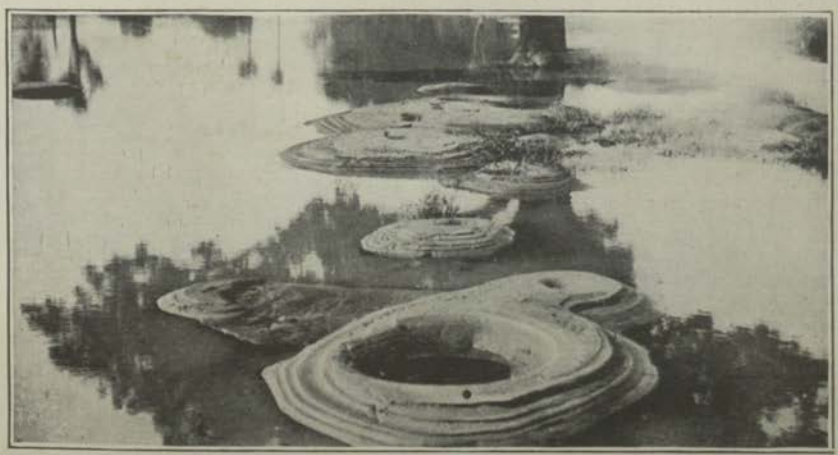
7. There are few reliable accounts of the behaviour of rivers during the actual shock, but it seems that in some places the beds of rivers became dry. Along the Ganges, the water first piled up against the south bank and then receded. After the shocks were over, the beds of many rivers and water-courses were found to have been filled with sand; the banks had come closer together, and the clogging of the channels often stopped or diminished the flow of water.

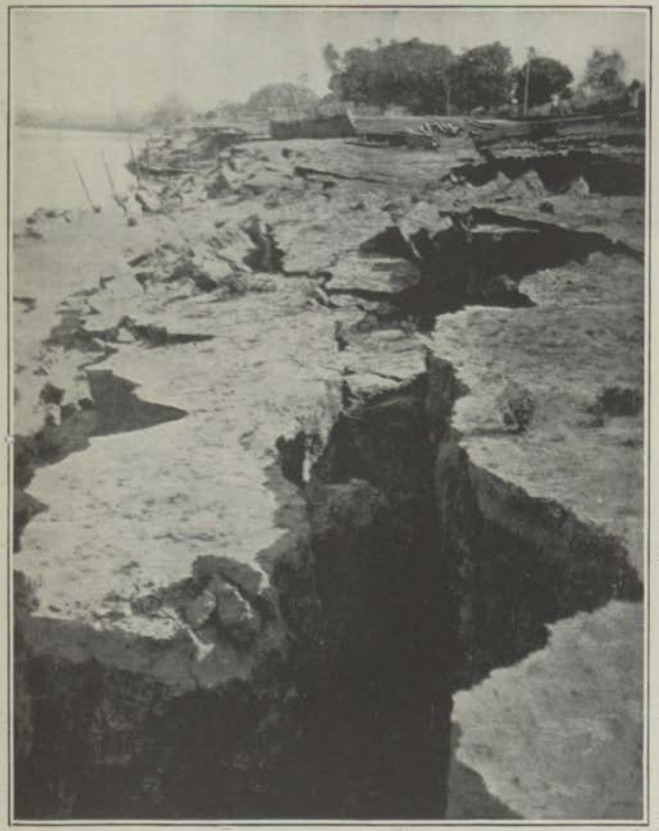
Bridges suffered in a variety of ways. The abutments sank or were displaced by fissures. Piers sometimes sank and sometimes were pushed up by the upraising of the river bed. In a number of cases the contraction of the banks caused the bridge to assume arched shapes of all descriptions.

Buildings.

8. Buildings were damaged or destroyed in vast numbers. In the central area of the earthquake, the tendency was more for buildings to sink into the ground than to collapse. Thus, at Motihari, Sitamarhi, and Purnea many buildings were left standing, but tilted at various angles. Though to outward appearance they seemed sound, a closer examination showed that the masonry was shattered. Outside the slump area, the lighter type of hut escaped undamaged, but mud huts were often damaged, while loosely built masonry buildings collapsed in very large numbers. Well-built masonry houses of good materials often held together well, but large numbers of such houses were destroyed by the

Sand geysers and earthquake water.





Muzaffarpur

In Champaran. The fissure is thirty feet wide, fifteen feet deep and 300 yards long.

Fissures

opening of fissures under their foundations. Where this occurred, the strength of the materials was seldom enough to stand the strain.

In areas where the soil did not fissure or slump, buildings were destroyed by violent shaking of the superstructure and the foundations themselves were not disturbed. Thus, in Monghyr town, though whole quarters were shaken into a tumbled mass of debris, the foundations, when the site was cleared, were found to have suffered but little disturbance.

The following description by Mr. C. H. Gordon, a planter who was motoring to the south of Sitamarhi, gives a vivid picture of the scene. He says: " My car suddenly began to rock in a most dangerous fashion; the motion appeared to be from the right back wheel to the front left wheel, or from a south-westerly direction. Owing to the sound of the engine I noticed no noise, but was told such was heard from the west, a deep terrifying rumble. As the rocking ceased, mud huts in the villages on either side of the road began to fall. To my right a lone dried palm trunk without a top was vigorously shaken, as an irate man might shake his stick. Then water-spouts, hundreds of them throwing up water and sand, were to be observed on the whole face of the country, the sand forming miniature volcanoes, whilst the water spouted out of the craters. Some of the spouts were quite six feet high. In a few minutes, on both sides of the road, as far as the eye could see, was a vast expanse of sand and water, water and sand. The road spouted water, and wide openings were to be seen across it ahead of me, then under me, and my car sank, while the water and sand bubbled and spat and sucked, till my axles were covered. ' Abandon ship ' was quickly obeyed, and my man and I stepped into knee deep hot water and sand and made for shore. It was a particularly cold afternoon, and to step into water of such temperature was surprising. Distressing was it to see the villagers, running some east, some west, others to, others from their fallen homes, wailing and beating their chests. In less than half an hour, I should say, the water-spouts ceased to play, though water oozed out of the land and trickled from the mouths of the lesser sand heaps."

Loss of life.

9. Though in its intensity and the area affected the Bihar earthquake equals the greatest recorded in history, the loss of human life was surprisingly small. In all, 7,253 deaths were reported. It is hardly surprising that many of those who had seen the devastation could not believe that the death roll had been so light. In all areas except Monghyr town this figure is the result

of counting through the agency of the police and the village watchmen and the staff employed in clearing the ruined quarters of the towns. The actual loss of life will never be known. It cannot be pretended that every single death was reported, but the figures cannot be very wide of the mark. In Monghyr town, where it was suggested that the casualties were far in excess of the number (1,260) accepted by Government, a careful house-to-house enquiry goes to show that this figure must be near the truth. The appearance of the Chauk and Madhopur quarters of Monghyr after the earthquake certainly suggested an enormous death roll, yet it has been definitely established that out of the 700 holdings in these two quarters, no casualties at all occurred in 530. The number of unclaimed bodies which were dealt with was 440.

These casualties were distributed as follows :—

Muzaffarpur town	...	...	956
Muzaffarpur district	...	...	1,583
Darbhanga town	...	...	310
Darbhanga district	...	...	1,839
Monghyr town ...	...	...	1,260
Monghyr district	...	...	237
Champaran district	...	...	499
Saran district ...	...	...	193
Bhagalpur district	...	...	174
Patna district ...	...	...	142
Gaya district ...	...	...	34
Shahabad district	...	...	22
Purnea district ...	...	...	2
Santal Parganas	...	...	2

Factors which reduced the death roll.

10. There are various factors which operated to lessen the loss of life. In the epicentral tract there are only two small towns. The shock occurred at a time of day when, in the rural areas, almost all the men and many of the women and children would normally be out of doors. It is probable that the casualties in the villages occurred chiefly among *purda* women. In the towns the proportion of the population which was indoors was naturally greater, but the shock continued for an appreciable time before the buildings actually fell and the inhabitants had time to evacuate them. Thus 400 persons were evacuated from the high buildings of the Peninsular Tobacco Company's factory at Monghyr with the

loss of only one life. In certain very congested bazars, numerous lives were lost because, though the people could get out of their houses, the roads were so narrow that the streets themselves could not be evacuated before the buildings fell, and the crowds, jammed into the narrow lanes, were crushed there by falling masonry. Conditions of this nature prevailed in the Chauk bazar in Monghyr and in certain bazars in Darbhanga and Muzaffarpur, but in other places the towns were sufficiently open to enable the inhabitants to reach comparatively open spaces. It must also be remembered that outbreaks of fire, which is usually responsible for the death roll where a modern city is wrecked by an earthquake, were very few. Though floods occurred by reason of the outpouring of water from the fissures, the water was not of sufficient depth to endanger life.

These circumstances operated to reduce the death roll to a figure so small that it must be unique for an earthquake of such magnitude. But if the shock had occurred at night, the loss of life must have been enormous. The people would have been in their houses, with doors and windows closely barred. The warning period would have been spent in awaking sleepers, and the exit from the buildings would have coincided with the time of their collapse. What the death roll would have been in those circumstances is fortunately only a matter of speculation, but it is difficult to see how it could have failed to run into hundreds of thousands.

CHAPTER III.

Immediate action in the districts.

11. In the district and subdivisional towns in the worst areas, the immediate effect was to sever communications with the outside world and to throw each place on its own resources. Bihar had not experienced a serious earthquake within living memory: the wholesale destruction, and the terrifying phenomena which accompanied the earthquake left the mass of the people stunned and dazed. The after-shocks which followed the main earthquake served to prolong panic, but did not actually do much damage.

Sitamarhi.

The two subdivisions worst affected were Sitamarhi, in the north of Muzaffarpur district, and Madhubani, in the north of Darbhanga district. In Sitamarhi only one house of any size, the P. W. D. inspection bungalow, escaped. The others were all tilted and twisted. They sank into the soil and no house was habitable. The court buildings sank three feet into the earth, the jail fell, and a fissure eighty yards long and eight feet wide appeared in the town. At Madhubani the damage was slightly less, but 70 to 80 per cent of the masonry buildings collapsed or were badly damaged. The Subdivisional Officers of these two places were Mr. C. K. Raman and Mr. W. G. Archer, two junior members of the Indian Civil Service with just over two years' service. Both these officers found themselves completely cut off. Mr. Raman was absent from his headquarters when the earthquake occurred and he returned to find the town of Sitamarhi in ruins and the sub-jail empty of prisoners. A camp hospital was quickly opened, effective steps were taken to control prices, the bridge on the Muzaffarpur road was reconstructed and the office was reopened on the 22nd of January.

Madhubani.

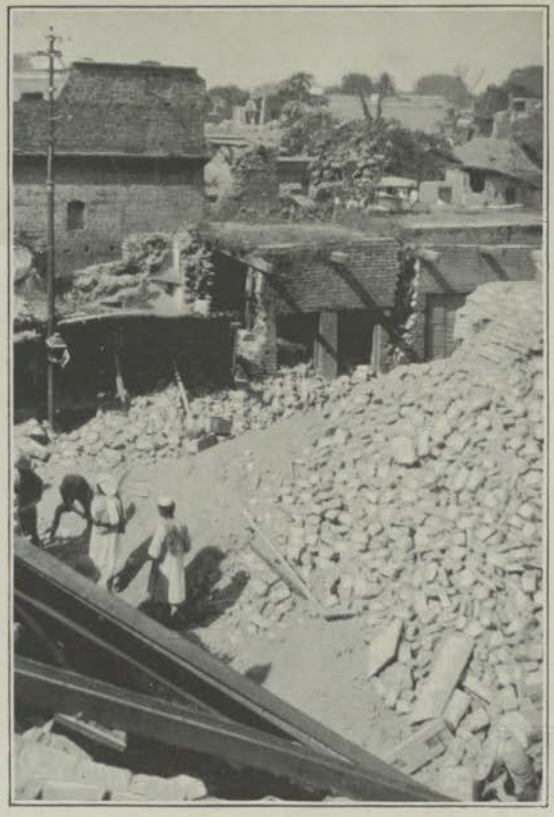
At Madhubani, when the earthquake occurred, Mr. Archer took immediate steps to strengthen the treasury guard, and to provide accommodation for the patients in the hospital and prisoners in the sub-jail. Living persons were removed from the debris in the town. On the following day, the clearing of the town began on systematic lines. Petrol was commandeered, and the supply of kerosene oil and salt was controlled. Mr. Archer was able to get in touch with his district headquarters on the 17th January. The office in Madhubani reopened on the 19th January.

The Chauk Bazar at Monghyr.

12. Among the district headquarters, the tragedy was most complete at Monghyr. The Superintendent of Police (Mr. W. C. Magrath) was injured by the fall of his house, and the District Officer (Mr. A. J. Mainwaring, I.C.S.) arranged for the mobilization of the armed police and the placing of an extra guard on the treasury. He saw the main bazar in ruins and the people paralysed by the shock. He then visited the jail where he found that the jailor had had the presence of mind to secure 280 prisoners in a shed. Arrangements were made to put an armed guard on them. The available police and officers then went to help in rescue work in the town. An open truck was supplied by the Tobacco Factory. Fortunately, the water tower was undamaged and the staff of the waterworks managed to repair the worst holes in the mains. Jamalpur supplied electric current by half past ten that night. At dusk fire broke out amongst the debris in the main bazar and it was not until half past three on the following morning that the worst fire was under control. This fire might easily have attained disastrous dimensions and ravaged the whole bazar. A small girl was rescued by the armed police within three yards of the fire after nearly five hours' digging. All night long the police patrolled the bazar and helped in the rescue work. The hospital staff treated all the injury cases they could and made them as comfortable as possible, but the patients could not be persuaded to occupy the lower storey of the women's hospital, which was undamaged. About midnight the Superintendent of Police from Bhagalpur (Mr. R. P. Wilson) arrived with 48 constables from the Training School and 32 of the Bhagalpur Military Police. The following morning by 8 A.M. 500 coolies had been collected. 270 men were sent from the Imperial Tobacco Company's factory under their officers with an open truck. The assistance of the staff of the Tobacco Factory was invaluable; the officers at the time were under orders of transfer, but the company kindly agreed to postpone the date of their transfer at considerable inconvenience to themselves in order to facilitate the work of clearance. All available officers with the District Magistrate went into the bazar and set about rescue work with the police under the direction of Mr. Wilson. **Monghyr.**

13. The first task was to make a way into the main bazar which was badly blocked. The side roads and lanes were completely obliterated and indistinguishable in the jumbled heap of ruins. From a portion of the main road about twelve yards in length over 40 bodies were recovered. Gangs of coolies were working wherever there was a prospect of recovering living persons. The second earthquake, which occurred at 10-30 A.M. on 16th January, caused a panic amongst the coolies, one of whom was killed. This **Clearance of the bazar.**

was caused by the fall of a portion of the front of Babu Kedar Nath Goenka's house which was blown up afterwards by Sappers. But about 300 coolies continued working until dark. The Commissioner of the Division (Mr. J. R. Dain, C.I.E., I.C.S.) arrived in the course of the day and also the Agent of the East Indian Railway. The Commissioner and the District Magistrate went to Jamalpur and arranged with the East Indian Railway workshops for tools for clearing work. The District Judge started preparing shelters for the patients in the hospital and a messenger was sent to Patna for medical stores required by the Civil Surgeon. An officer was put on duty to collect food supplies to distribute as relief. Arrangements were made on that day with the Subdivisional Officer of Jamui to send kerosene hand lamps and also more labourers. Notifications were sent round the bazar that any shop-keepers found profiteering would be prosecuted. Volunteers came in from outside the town bringing food for distribution. In the afternoon another 44 police arrived. On the 17th January the work of clearing the bazar continued and the main bazar road was opened out. About 100 bodies were taken out of the debris and arrangements were made for burning them at the ghat under the supervision of a gazetted officer. The distribution of food and the erection of shelters continued throughout this day. Canon S. K. Tarafdar with a party of boy scouts arrived from Bhagalpur and started ambulance work at once. The Bhagalpur Marwari Sudhar Samiti also arrived and began to work. Tents came in from Jamui and were supplied to the hospital. On the 18th January the work continued. More police arrived to help. Arrangements were made for coolies from Jhajha and Dumka. A relief party came from Nawada and another of Marwaris from Calcutta. The Salvation Army officers started ambulance work, and, with the help of the Jamalpur hospital motor ambulance, 122 cases of injury lying on the outskirts of the main bazar were brought in and treated. The Commissioner again visited the town that day with the Inspector-General of Police (Lt.-Colonel A. E. J. C. McDowell). On the 18th January the Power House started running again. On the 19th a detachment of Sappers and Miners arrived from Kharagpur and started the demolition of dangerous houses. The Public Health Officer of the Bhagalpur district board, Dr. D. B. Mukharji, arrived on this day and two members of the Santal Mission, Messrs. H. D. Strever and C. Jensen, came with a car and assisted the Salvation Army officers with ambulance work. On the 20th January a special train sent by the Tata Iron and Steel Company, Ltd. arrived with 120 tons of iron sheets, five trucks of rice and mechanics and tools, and at once started putting up



Clearing the streets at Muzaffarpur. Men of the East Yorkshire Regiment at work.

temporary buildings for the hospital and other housing work. Four relief centres were organized for distribution of food, blankets, etc., with medical aid attached to each. Dr. Mukharji with the assistance of Mr. K. R. Bhide, the Town Engineer sent by Messrs. Tatas, started a sanitation centre. By January 24th, the Red Cross Hospital unit from Calcutta started work.

14. The greater part of the town of Muzaffarpur north of the railway station suffered very severely. The Civil Courts, the Collectorate, the Commissioner's office and the Imperial Bank suffered badly. The record room, a recently-built one-storeyed building, and the newly-built criminal courts withstood the shock. The Judge's and the Collector's bungalows collapsed completely. The district jail was seriously damaged. In the Purana bazar and its neighbourhood most of the buildings, many of which were old two-storeyed buildings built of poor material, collapsed either partially or totally, and many lives were lost in these bazars. South of the railway station, the Commissioner's house, the Deputy Inspector-General of Police's house, and the Circuit House were only slightly damaged. Most of the wells were choked with fine sand, while tanks which had been dry before the earthquake were filled with water, and those that had contained water became shallower. **Muzaffarpur.**

As soon as the earthquake occurred, assistance was obtained from the Officer Commanding the detachment of the 1st Battalion, the East Yorkshire Regiment, Capt. R. A. B. Cooper. The troops took over the treasury guard and at night they relieved the police of guarding the jail, a large part of the wall of which had collapsed. The electric light was cut off and the water-supply precarious. Police patrols were sent to the town to prevent looting and to do rescue work. All available officers were deputed by the District Officer (Mr. R. E. Swanzy, I.C.S.), to render first aid to the injured and to convey them to the hospital. There was a shortage of coolies. By the 16th January police patrols were organized to do rescue work by day and to prevent looting by night. All taxis and lorries were mobilized, and the Burma Oil Company arranged to keep a reserve of petrol. The British Infantry also set a fine example in clearing the debris on the roads of the town. An adequate supply of food was reserved and guarded, and shopkeepers warned that, if they attempted to profiteer, their stocks would be taken over. Major S. L. Mitra, I.M.S., of the Public Health Department, took charge of the public health of the town on the 17th January. By the 18th January, 12 relief centres and four sanitation centres were opened; one tank was properly disinfected and drinking water

from it was distributed in lorries. Arrangements were made to clean the 35 places at which refugees were camped by means of a properly organized staff of sweepers under the municipal jamadars.

Darbhanga. 15. At Darbhanga the damage was less than at Muzaffarpur and the destruction of buildings was not so wholesale. In general, walls running from east to west collapsed while those running from north to south were cracked. In the heart of the town many buildings collapsed, those belonging to the Darbhanga Raj being the worst affected. The Post Office, the Northbrook School and the Medical School were badly damaged, but the worst havoc was in the Katki and Bari bazars which contained two-storeyed *kutcha-pucca* and *pucca* buildings.

Laheriaserai, the civil station, four miles away, also suffered badly and even one-storeyed buildings collapsed in some cases. The Town Hall and the hospital buildings collapsed partially, and a few Government quarters provided for Indian officers were badly damaged. The jail was also badly damaged; some of the buildings sank and parts of the enclosure wall collapsed.

When the earthquake occurred the District Officer (Mr. T. A. Freston, I.C.S.) was on tour and he was unable to reach head-quarters until midday on the 17th January. As soon as the earthquake occurred the police turned out under the Superintendent of Police (Mr. J. E. Pearman) and the Sadr Subdivisional Officer who moved about the town supervising the work of rescue. First-aid stations were opened at the police lines and on the Darbhanga Raj maidan. By the 16th January camp hospitals had been opened on the polo ground at Laheriaserai and on the Raj football ground at Darbhanga. The police were deputed for rescue work and they arranged for the disposal of dead bodies, while magistrates were sent to each town outpost with an advance of money to assist with rescue and relief. When the District Magistrate returned, proclamations were issued calling for labour for clearing the roads. On the 18th January gangs of coolies were organized, a public meeting was held and two sub-committees appointed to supervise and organize conservancy. Proclamations were issued prescribing the prices of food, and a bulletin was published containing the latest news and notices for the public. In the evening three Public Health doctors arrived from Muzaffarpur, of whom one remained in Darbhanga, one was sent to Madhubani, and the third to Samastipur. Special latrines were put up in each municipal ward and parties of medical students were deputed to the bazar. On the 19th January the work continued; the treasury and the Imperial Bank opened and wells

were disinfected throughout the town. In the evening the Gurkha Military Police arrived. A relief hospital sent by Messrs. B. K. Paul of Calcutta worked in conjunction with the Darbhanga Raj hospital and deserves special mention.

16. Motihari was completely cut off by road, rail and telegraph for days after the earthquake. The slumping of the ground was particularly remarkable on the edges of the lakes, and buildings were tilted at all angles in a most spectacular fashion. Hardly any of the Government buildings survived. The District Officer (Mr. S. L. Marwood, I.C.S.) first made his way on foot to the town from his bungalow, which was wrecked, and met the Superintendent of Police (Mr. R. E. S. Ferguson), who had already doubled the police guard on the treasury and jail. He proceeded with difficulty to the Sadr hospital, which was also in ruins and made temporary arrangements for in-patients and treatment of the injured. He then circulated a notice of a public meeting on the following day and made arrangements for night patrols. On the following day he assisted the Superintendent of Post Offices to send out repair gangs to repair the telegraph line. A public meeting was held and volunteers were enrolled as special police officers. Mr. W. H. Meyrick, a planter, with Babu Braj Behari Singh, Deputy Magistrate, as his assistant, was placed in charge of food control, and another Deputy Magistrate, Babu Shiva Nandan Sahay, was placed in charge of sanitation. A camp office and report centre was arranged in the Zila school compound in the centre of the town. At 2 P.M. an aeroplane flew low over the town. This was the aeroplane belonging to Barnard's Circus to which reference is made elsewhere. At 3 o'clock in the afternoon the District Officer received a letter which was brought by a messenger on foot from Bettiah. **Motihari.**

On the 17th January at 9 A.M. an aeroplane carrying Mr. E. L. Marriott, Deputy Inspector-General of Police, dropped a message that police help was coming through Gobindganj and asked whether doctors were wanted. Food prices were fixed and published, and news bulletins were published. In the afternoon efforts were made to save some of the materials of the Collectorate office. At 4 o'clock the telegraph was reported open to Muzaffarpur.

On the 18th January the state of the town had improved; the crevices in the main road were filled up and the demolition gangs were dealing with dangerous houses under the supervision of a Public Works Department overseer. The injured were then all under treatment and in most of the wards of the municipality the dead bodies had been located and removed.

On the 19th January Mr. Marwood got his first news of the outside world in the shape of a copy of the *Statesman* of the previous day. By the 20th the treasury was reopened and the Bank of Bihar was also reopened by the side of the road. By the 21st the roads had become more passable owing to the energetic action of the District Engineer, Mr. N. H. Vakil. The main roads cross the two long lakes on which Motihari is built and the collapse of their bridges caused the town to be isolated to a special degree.

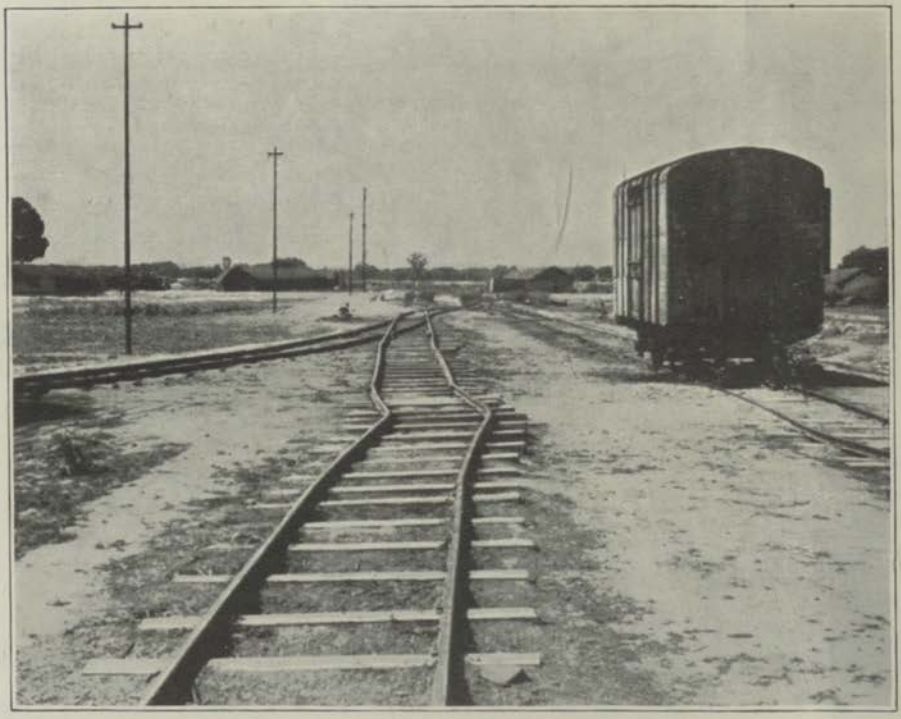
Behaviour of the people.

17. Everywhere the emergency exhibited the people in a very favourable light. The officers of Government took immediate and effective charge of the situation. The measures which they took to meet the strange situation which developed in so sudden a fashion were sensible and usually adequate. They were loyally supported by the officials of the district boards and municipalities and by private gentlemen of influence. Old differences were forgotten in the common danger and all classes, creeds and parties co-operated in the work. Good humour prevailed, and the crop of amusing stories of earthquake contretemps which became current showed that the people could still see the lighter aspect of the calamity. Many threw themselves wholeheartedly into the work of rescue, which was often extremely dangerous, without being able to look after their own dependants. Special credit is due to the police of all ranks who worked unremittingly in rescuing the injured and in performing the numerous unusual tasks which arose. Government issued a special resolution commending the services of the police.

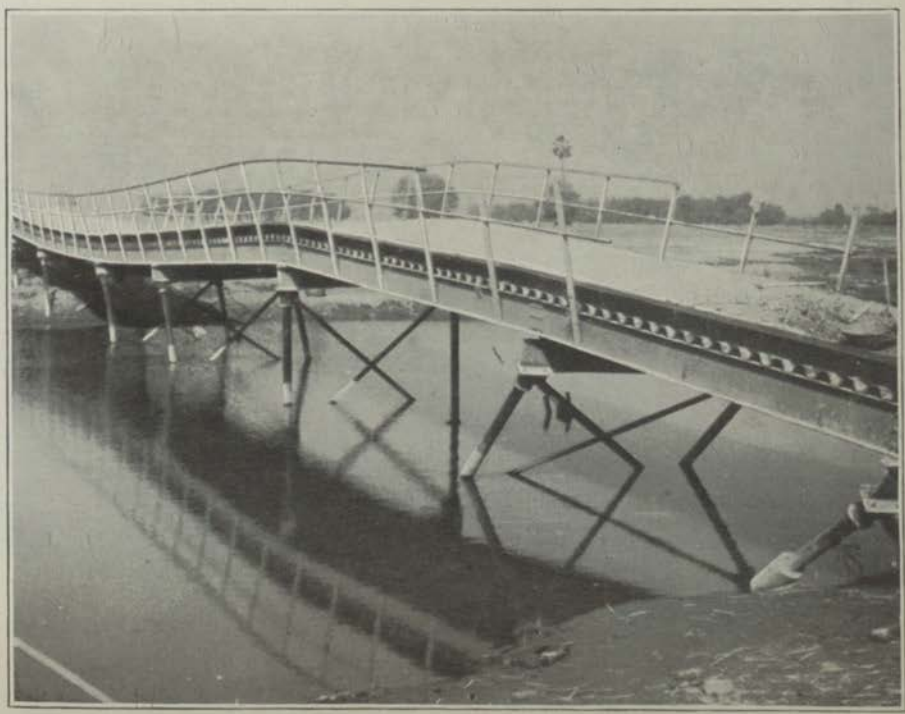
In a number of places there were attempts at profiteering on the part of traders. But public opinion was overwhelmingly against them and a few simple measures were usually sufficient to bring prices down to reasonable levels. In some places supplies were short and it was necessary to organize fresh supplies. The work done by Mr. W. H. Meyrick at Motihari in this respect was particularly valuable.

Rapid restoration of railway communications.

18. Special mention must be made of the rapidity with which railway communications were restored. The Bengal and North-Western Railway has about 2,100 miles of track, about one-third of which is in the area of the severest damage. Over 900 miles of line, hardly a mile of track was undisturbed. Many of the major bridges collapsed and hardly a culvert could be used until it had been examined and repaired. In all 361 bridges and culverts were destroyed or damaged. In many cases the permanent way was twisted and broken and large quantities of rolling stock were marooned. By the end of January 1,683 miles were open



Railway track distorted laterally.



Screw pile bridge wrecked.

to traffic. A further 300 miles were opened in February and by the middle of April all lines had been reopened. The achievement is one which reflects the greatest credit on the staff. The officers of the Railway were extremely helpful in assisting the transport of urgent goods and adapting their arrangements to suit relief measures. Throughout there was a complete absence of red tape.

CHAPTER IV.

Immediate action at headquarters.

Absence of news.

19. At the provincial headquarters, the immediate difficulty was the break-down of telegraphic communications. It was impossible to find out what had happened in Tirhut or at Monghyr, or to know what assistance was necessary. As the roads and railways in Tirhut were largely out of action, messages by these means were extremely slow. The telegraph line to Muzaffarpur was reopened at 10 A.M. on the 16th and that to Monghyr on the 17th. Motihari had to wait till the 18th, and Darbhanga till the 19th, before the telegraph could be used. The first news of the disaster in Muzaffarpur reached Government on the morning of the 16th by a letter sent down by hand during the night. From Monghyr the first news was a telegram despatched by the Commissioner from Bhagalpur on the evening of the 15th, which reached Patna on the morning of the 16th. The same day a party of four doctors and five senior medical students was despatched to Monghyr. On the morning of the 17th seven Public Health doctors left for Muzaffarpur.

Aeroplanes.

20. At midday of the 16th Government telegraphed to Calcutta for two aeroplanes. By 5 P.M. of the same day an aeroplane attached to the group known as "Captain Barnard's Circus" reached Patna. It had landed at Muzaffarpur, where a somewhat precarious landing ground had been prepared and marked among the fissures which covered the Sikandarpur maidan. A reconnaissance was made towards Sitamarhi and Motihari that day. On the 17th, another aeroplane belonging to the Indian Air Survey and Transport Company arrived from Calcutta and was used for a journey to Muzaffarpur. His Excellency the Governor went to Tirhut by air on the following day. On the 19th January, there arrived the Bengal Government aeroplane, and a private aeroplane belonging to Mr. H. I. Mathews, who placed his aeroplane and his own services at the disposal of Government. On the 25th an aeroplane lent by the Royal Air Force arrived and was in continuous use till it was wrecked in taking off at Darbhanga on the 11th February. The Hon'ble Mr. Whitty, Member of Council, was seriously injured in this accident.

21. One of the first anxieties of Government was lest there might be outbreaks of disorder and looting in the shattered towns. 130 police from Bhagalpur started for Monghyr on the 15th January, some of whom arrived that day and some the following morning. On the morning of the 16th January the Gurkha Military Police at Ranchi, the Mounted Military Police at Arrah and the armed police at Hazaribagh and Gaya were ordered to stand by to move at a moment's notice, and the same evening they were ordered to move to Patna. On the same day, the 16th January, the armed police of the Santal Parganas and Ranchi districts were ordered to stand by, and another 128 men were ordered to Monghyr from Barhi and the Constables' Training School at Nathnagar. A detachment from Bihpur were ordered to Muzaffarpur, but was unable to get there. Three troops of the Mounted Military Police, moving across country, reached Muzaffarpur on the evening of the 18th January and a party of Gurkha Military Police reached Muzaffarpur the same evening and left for Darbhanga the following morning. Another party of Gurkhas left Patna for Motihari on the 18th January, and yet another party was used on the lines of communication between Patna and Muzaffarpur. A party of the Hazaribagh armed police was sent to Bettiah and others were used on the lines of communication. On the 18th January the armed police of Palamau, Dhanbad and Purulia were ordered to stand by. Thus, during the three days after the earthquake, a force of over 200 men was moved across the river into Tirhut, some 250 men were moved to Monghyr, and a further large force was kept ready to move at a moment's notice. The prompt movement of these forces of police, almost unnoticed by the public, reflected great credit on the Police Department. Actually the menace of looting came to nothing. Partly owing to the state of dazed stupefaction which prevailed for some days, partly owing to the efficient measures which were taken to control prices, and partly because of the prompt arrival of the police, there was an almost total absence of crime of this character. **Police reinforcements.**

The Territorial Force, the Bihar and Orissa Wing of the 11/19 Infantry had been embodied and was undergoing training. Government arranged for the extension of the period of training and the force was used for general duties at Monghyr and for guard duties in Tirhut.

22. An urgent need arose for expert help in the work of clearing the wreckage of buildings and demolishing structures which had been left in a dangerous state by the earthquake. In response to requests by the local Government, the military authorities **Assistance from the military authorities.**

despatched a detachment of Sappers and Miners and a detachment of the 3rd Battalion, 18th Royal Garhwal Rifles. These arrived in Monghyr by special train from Midnapore and began work on the 19th. Further detachments of Sappers and Miners arrived from Jhansi and Roorki and reached Muzaffarpur and Darbhanga on the 21st and 22nd January. A further detachment came to Muzaffarpur early in February and was of the greatest assistance in repairing and constructing bridges on the main lines of road.

The clearing of debris at Muzaffarpur and Monghyr was greatly facilitated by the arrival of 10 30-cwt. lorries and 25 3-ton lorries, lent by the I. A. S. C. at the request of Government.

Tents were very urgently needed to shelter those whose houses had collapsed or were temporarily uninhabitable. In response to appeals from the local Government, large quantities of tents were lent by the military authorities and other Governments. Tents from the unaffected districts were also collected and a special officer placed in charge of the distribution and transport of all tents.

His Majesty's message.

23. A gracious message of sympathy was received from His Majesty the King-Emperor in the following terms :—

"I have been much shocked to hear of the grave loss of life and property which has been caused in India by the recent disastrous earthquake. I shall be glad if you will ask the Governors of the provinces affected to convey to those who have suffered in this catastrophe a message of deep sympathy from the Queen and myself.

GEORGE R. I."

This message was at once communicated to the areas affected.

Messages of sympathy were received from the Secretary of State and from His Excellency the Viceroy, as well as from Governors of other provinces, and many organizations and persons.

Offers of help were received from other Governments. The Government of the United Provinces took the very practical step of deputing an officer to Patna to get in touch with the local Government and to see in what way assistance could be rendered. That Government undertook the opening of communication with Nepal, which had suffered great damage. This relieved the Bihar Government of a task which they would have found it difficult to carry out in the midst of their other preoccupations.

Supply of medical stores and comforts.

24. An appeal was broadcast for blankets, clothing, bandages and medical stores of all kinds for the sufferers. A depot was opened at Patna by the Bihar and Orissa branch of the Indian

Red Cross Society to serve as a distributing centre, and all stores were forwarded through its agency. During the busiest weeks, several tons of articles passed through the depot every day. It distributed over 40,000 blankets, 546 tents and 4,840 bags of *atta*, in addition to quantities of other articles, which were received in response to the appeal.

To ensure the rapid transport of stores north of the Ganges in the first emergency a special organization was created under the Deputy Inspector-General of Police, Central Range. With the active co-operation of the officials of the Bengal and North-Western Railway, buses commandeered in Patna were put across the river and transport officers placed at Paleza Ghat, Hajipur and at the railhead at Goraul. From that point, a road service was organized into Muzaffarpur. When railway communications with Muzaffarpur were opened on the 27th, the officers were moved on to Muzaffarpur and Samastipur, and organized road transport with Motihari and Darbhanga respectively. The organization was staffed by police officers, and professors and students from the colleges in Patna escorted the consignments. The transportation staff dealt with 8,073 packages of various weights, sizes and shapes in addition to tents. Only one package went astray and one was stolen *en route*.

Relief funds.

25. The flow of relief materials into the affected area was helped by the announcement that the railways would carry relief stores at half rates and would forward urgent articles by passenger train. Immediately after the earthquake Government placed Rs. 6,000 at the disposal of each District Magistrate for immediate expenditure on relief. The district boards of Tirhut were authorized to overdraw their balances by six lakhs of rupees to enable them to execute urgent repairs to the damaged roads. Rs. 24,000 was distributed by the Red Cross Society to the Collectors for expenditure on relief. Arrangements were made to open a provincial relief fund at Patna, but when on the 19th His Excellency the Viceroy announced the opening of the Viceroy's Earthquake Relief Fund, subscriptions were diverted to that Fund. Large subscriptions were made throughout India and in England to the Viceroy's Earthquake Relief Fund, which ultimately reached a total of over 60 lakhs of rupees. The expenditure of the Fund in Bihar was placed in the hands of an organizing committee consisting of His Excellency the Governor as President, the Hon'ble Mr. J. T. Whitty, the Hon'ble Mr. J. A. Hubback, the Hon'ble Babu Rajandhari Sinha, Mr. Kulwant Sahay and Sir S. Sultan Ahmad. Mr. W. B. Brett, the Relief Commissioner, was co-opted as a member at a later stage.

The Mayor of Calcutta, Mr. Santosh Kumar Bose, opened a special fund which amounted to four lakhs seventy-five thousand rupees. The Mayor took a keen personal interest in the administration of the fund and himself came to Patna and the affected areas in order to satisfy himself that it was being devoted to the most suitable objects.

On the 22nd January Babu Rajendra Prasad, the Bihar Congress leader, wrote to Government stating that he had been appointed president of a non-official organization which had been formed under the name of the Bihar Central Relief Committee, the object of which was to render such help and relief as it could to the sufferers from the earthquake, in which work it would be its privilege to assist and co-operate with other organizations, official and non-official, working for relief. He assured the Government that in this humanitarian work there should be but one consideration, to render such service as might be possible, and he also assured the Government that the Committee would always be prepared to give and receive such co-operation as might be required. In reply, the local Government stated that the work of the relief of the distressed population promised by his Committee was greatly appreciated, as was also his assurance that the Committee would be always prepared to assist and co-operate with other organizations, official and non-official, working for relief.

CHAPTER V.

The initiation of reconstruction measures.

26. As soon as the immediate relief measures had been organized, it was possible for the local Government to take fuller stock of the various problems which confronted them, and to determine how they could best embark on the restoration of the damage which the earthquake had caused. It was evident that the process of reconstruction must occupy a considerable time and that its cost would be far beyond the financial resources of the province. But at this stage it was extremely difficult to obtain accurate information of the real extent and nature of the damage. Communications had been impaired to a marked degree in North Bihar, and though it was possible to form a working idea of the damage done in towns and along the main lines of communications, it was more difficult to find out what had really happened in the remoter rural areas. In much of the information which came in there was a tendency to generalize on a few striking instances of damage, a natural inclination to exaggeration and a desire not to minimize the sufferings of the people and so to dry up the stream of private charity. The first need was therefore to ascertain the facts on which action must be taken. This task was particularly difficult because, except for the police, almost all Government agencies are concentrated in the towns, and all officers were fully engaged in dealing with immediate needs. A further complication lay in the manner in which the various problems were inter-related. It was clearly useless to rebuild, or to advise others to rebuild, until it was known whether the soil was sufficiently stable to bear the weight of buildings. Again, the possible changes in levels resulting from the earthquake rendered it unsafe to build even on sound soil, if it was likely that the alluvial rivers which traverse the country would find new channels for themselves. The administration could rely on about four months of dry weather, after which the monsoon would break.

27. The situation can best be described by indicating the different problems which presented themselves to Government in the beginning of February 1934.

(1) Was it necessary to make plans on the assumption that Bihar would suffer from disastrous earthquakes in the near future, or could it be taken that a long period of stable conditions

was likely? Could the geologists investigate the nature and causes of the earthquake with sufficient speed and certainty to enable an immediate beginning to be made with the reconstruction of buildings and public works?

(2) It was known that many of the rivers were flowing with greatly diminished force in beds which were now choked with sand. To the eye it appeared that appreciable changes had occurred in the level of the country. Great lakes of shallow water, ejected through the fissures, occupied parts of the country. They were dispersing with ominous slowness, and there were numerous instances in which the level of the sub-soil water had suddenly risen by as much as twelve feet. In a country with marked changes in level, these phenomena might not have been alarming; but in an almost flat country, with the rivers flowing over the alluvial plain in beds higher than the surrounding country, the evidence suggested that the rivers might change their courses completely and that depressions might have been formed with no outlet for their drainage, so that the normal monsoon floods might be entirely disastrous.

(3) Sand had been ejected from the soil and lay in vast quantities over the country-side. The extent of country so affected was unknown. Reports came in which suggested that continuous banks of sand, three or four feet deep, spread over miles of country. Were these deposits of a nature which would render a large part of North Bihar uncultivable? If so, what was to be done for the agricultural population, over 800 to the square mile, which was deprived of its only source of livelihood? If the worst anticipations were realized, it might be necessary to transplant millions of cultivators to new homes.

(4) The earthquake occurred early in the sugar-cane crushing season. A large proportion of the sugar factories had been damaged by the earthquake and could no longer absorb the cane. Railway communications were everywhere impaired. If no means could be devised to market the crop, it would have to be destroyed or used as fodder, and a loss of forty lakhs of rupees added to the damage which the cultivators had already sustained.

(5) Throughout North Bihar the wells which supply the population with drinking water had been choked with sand or even destroyed by the violent eruption of sand and water. The tanks at which the cattle are watered had frequently been filled with sand. Not only was it imperative to devise immediate measures to restore the water-supply, but it was necessary to provide against shortage in the approaching hot weather. A failure to effect

Sand Geysers

remedial measures was likely to result in outbreaks of cholera and other epidemic diseases.

(6) Throughout the area, public and residential buildings belonging to Government had collapsed or suffered severe damage. Canals and embankments had been damaged. The replacement of these works was a gigantic task which had to be faced at once.

(7) Similarly roads and buildings belonging to the district boards and municipalities had suffered damage estimated to cost at least a crore of rupees to replace. It was clear that the local bodies themselves could not finance the requisite measures and would have to be given large grants. The principles on which these grants should be admissible, and the arrangements necessary to supervise their expenditure, had to be worked out. The municipalities, in particular, were faced with the loss of an important part of their revenue which was derived from the tax on houses. At the same time the towns had to be cleared of debris, and the ordinary services adapted to new conditions.

(8) The greatest of all the problems was how to facilitate the rebuilding of private houses. It was necessary to give expert advice to the owners how they could best rebuild. Some portions of the towns, such as the centre of Monghyr, obviously could never be rebuilt in their old form and the replanning of such areas became an urgent necessity. Though no estimate was, or could be formed of the damage to house property, it was known to be colossal. Not only was financial help necessary to enable private persons to rebuild, but elaborate precautions were necessary to ensure that a great sudden demand for building materials of all sorts did not cause supplies to fall short and prices to rise to famine levels. It was clear that rebuilding could not proceed sufficiently quickly in some of the towns to enable the whole population to obtain adequate shelter before the monsoon broke. Temporary housing on a large scale seemed to be necessary.

Such were the main problems which confronted the local Government. The manner in which they were approached, the measures which were taken, and the degree of success or failure which has attended these measures, is described in more detail in the succeeding chapters.

CHAPTER VI.

Financial measures.

Financial help from the Government of India.

28. It is convenient at this point to deal with the financial side of the operations. The Government of Bihar and Orissa possesses a small revenue of about five crores of rupees a year. It had come through four years of the economic depression, and by severe economy had avoided the incurring of debt. The obligatory expenditure can only just be met from this revenue, and none of the sources of taxation are capable of expansion. The problem of paying for the earthquake operations out of the resources of the province would have been insoluble. At an early stage, as soon as the extent of damage became apparent, the Government of India assured the local Government of their full financial support. The detailed arrangements were announced in the course of Sir George Schuster's budget speech on the 28th of February 1934.* Under these arrangements, the Government of India agreed to find the full cost of replacing damage done to the property of the local bodies, and of schools, hospitals and other institutions which received aid from the local bodies or from Government. In addition they undertook to make grants to local bodies whose resources had been crippled by the earthquake, to enable them to meet their current expenditure until the crisis had passed. The Government of India agreed to provide half the cost of replacing the property of the local Government and to lend the balance. Finally advances were promised to cover the cost of the house-building loans which the local Government proposed to issue to the public. It was proposed to use the local Government's Famine Relief Fund for replacing agricultural damage, and the Government of India undertook to supplement this, if further expenditure proved necessary. The cost of the special sugar-cane measures was also found by the Government of India.

Charitable funds.

29. These arrangements covered the expenditure likely to be financed from Government revenues. For expenditure of a charitable nature, there was available the Viceroy's Earthquake Relief Fund which ultimately reached over Rs. 60 lakhs. This Fund was the principal source from which expenditure for the direct benefit of sufferers was met. All disbursements from the Fund were made by official agencies. The fund raised by Mr. Santosh Kumar Basu, Mayor of Calcutta, which amounted to 4¾ lakhs of rupees, was

* Appendix I.

spent in consultation with Government and largely by Government officers. A sum of Rs. 28½ lakhs was collected by the Bihar Central Relief Committee. The office-bearers of this Committee frequently consulted the Relief Commissioner on the expenditure of the fund, but retained the expenditure entirely in their own hands.

CHAPTER VII.

Measures of organization.

Creation of the Reconstruction Department.

30. A special department of Government was organized under a Relief Commissioner, who was also appointed a Secretary to Government. The problems created by the earthquake affected almost all branches of the administration, but it was found that the main decisions could be made more expeditiously, and that they could be co-ordinated better, if the Secretariat work was concentrated in one department. His Excellency the Governor acted as Member-in-charge of this department. The Relief Commissioner made frequent tours in the districts, for the purpose of inspecting reconstruction work and maintaining close touch between Government and the local officers actually engaged in the operations. He did not exercise any executive powers in the districts.

Town Engineers.

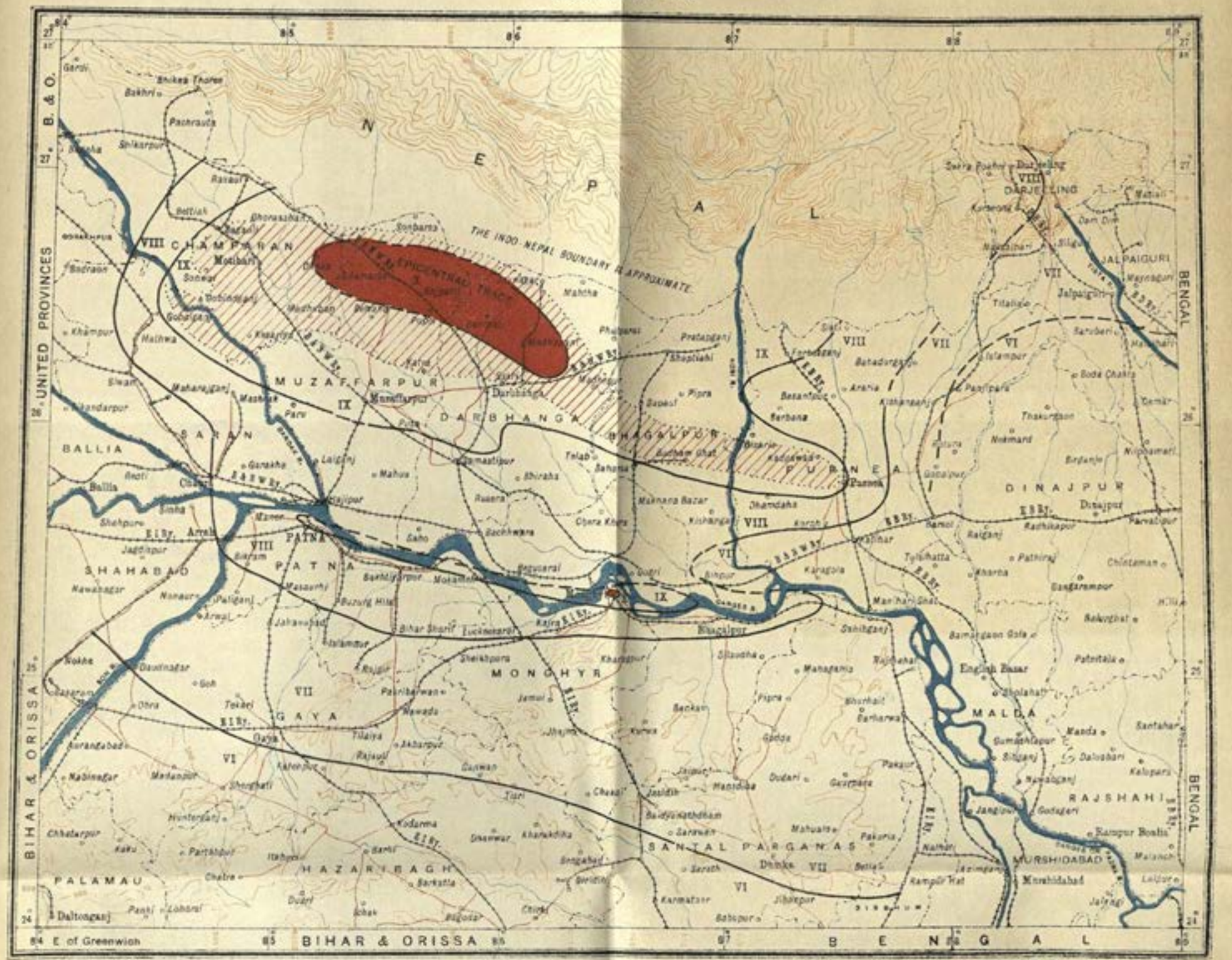
31. The officers of the Public Works Department were fully occupied in the repair and reconstruction of the buildings under their charge and had no time for other work. To supply engineering advice to the public and to the municipal bodies in the towns which had suffered most, four new posts of Executive Engineer were created under the title of " Town Engineer ". Two of these officers were Executive Engineers lent by the Governments of Burma and Assam, and two were recruited direct. They were stationed at Monghyr, Muzaffarpur, Darbhanga and Motihari, and the outlying towns of these districts and of the district of Saran were also placed under their charge. Their duties were to supply advice to the public on the rebuilding of houses, to control supplies of building materials, to advise the Collectors in connection with the issue of house-building loans and free grants, and to supervise the preparation of the estimates for the replacement of municipal property and the execution of the work. They were supervised by the Relief Engineer and Supply Officer, who was the technical adviser of the Relief Commissioner on engineering matters and was also charged with the responsibility for initiating and carrying out the measures for the control of supplies of building materials.

32. The damage suffered by the roads, bridges and buildings of the district boards in Tirhut was so extensive, and the problems arising out of their reconstruction so intricate, that a special Superintending Engineer was appointed to act as Inspector of Local Works in the Tirhut division. He was given a small staff of

THE BIHAR EARTHQUAKE

OF THE 15TH JANUARY 1934

ISOSEISMAL MAP



Reg. No. 43-34-2804

COMPILED & ZINCOGRAPHED IN THE S. & G. SURVEY OFFICE, GULZARBAGH, PATNA, IN 1934

Boundary :— Province, District

Railways, Important Roads

River & Stream

Scale 1 inch to 32 Miles

Kilms 30 10 0 20 40 60 80 Miles

The isoseismal lines are based on the Mercalli scale.

Contour intervals 500 feet.

Isoseist X

Slump Belt

Isoseismal lines

Assistant Engineers. He was responsible for dealing at first hand with the manifold problems which arose in connection with the reconstruction of district board roads and buildings. The task was arduous and involved constant tours of inspection.

Extensive reorganization was also necessary in the Public Works Department. A new post of Deputy Chief Engineer was created at headquarters. The Bhagalpur division was constituted a separate circle, under a Superintending Engineer, while new Executive Engineers divisions were opened at Bhagalpur, Darbhanga, Motihari and Patna. Almost the whole strength of the Public Works Department cadre had to be concentrated in the earthquake areas in order to staff these new posts.

CHAPTER VIII.

Scientific investigation of the earthquake.

Nature of the earthquake.

33. The Director of the Geological Survey of India deputed three of his officers, Dr. J. A. Dunn and Messrs. J. B. Auden and A. M. N. Ghosh, to investigate the scientific aspect of the earthquake. They were also instructed to endeavour to supply advice bearing on the reconstruction of the devastated region. The officers reached Patna on the 24th of January; the field work was not complete until the second week in April. In May, they submitted a report, the greater part of which were published by the local Government for public information in June. The scientific views expressed in this report were tentative, since the complete evidence had not been studied at the time when it was written.

The investigation indicated that the Bihar earthquake, both in the violence of the shocks and in the area of severe intensity, was one of the greatest earthquakes in history. The area of maximum intensity reached the degree of X on the Mercalli modification of the Rossi-Forel scale, and occupied a belt some 20 miles wide and some 80 miles long from Motihari through Sitamarhi and Madhubani and continuing as a belt of lower intensity to Purnea. At Monghyr, the same degree of intensity was reached. The area of very severe intensity, corresponding to IX on the same scale, covered at least 6,000 square miles, extending west and east from Motihari to Purnea and southward to the line Gopalganj, Pusa, Saharsa and Purnea. Another belt of intensity IX ran along the south bank of the Ganges from Patna nearly to Bhagalpur.

The earthquake was of the nature known as tectonic, arising out of a sudden fracture of the earth's crust, or from relative movement along some old fault plane. It is unnecessary here to discuss the possible causes of the fracture which evidently occurred deep in the crust of the earth below the alluvium of the Gangetic plain. The report stressed the fact that the border of the Gangetic alluvium and of the Himalaya is a seismic region, and that earthquakes are to be expected along this belt in the future. There seems to be no definite periodicity in violent earthquakes and it is impossible to state that the last period of relative quiescence between 1833 and 1934 will be followed by another of the same duration.

34. The report of Messrs. Dunn, Auden and Ghosh put forward recommendations, based on their observations, regarding the reconstruction of buildings. They advised that in North Bihar heavy buildings should not be constructed until the dry season of 1934-35 was well advanced, since the alluvial soil was liable to subside irregularly for some months, even in places which exhibited no visible danger signs. Such buildings should not be constructed near depressions. Buildings should be given adequate foundations and proper bracing. They should be of sound materials, one-storied and as light as possible. In the belt of maximum intensity the use of steel or timber framed structures was recommended. Masonry arched bridges and culverts should be avoided, and screw pile bridges adopted wherever possible. **Recommendations on rebuilding.**

South of the Ganges, the danger of subsidence was absent, except possibly at Monghyr. Heavy buildings along the river front at Patna should be avoided, but elsewhere well-built single storey brick buildings were reasonably safe.

CHAPTER IX.

Changes in the level of the country.

The survey of levels.

35. The violent shaking to which the alluvial soil had been subjected had the general effect of causing raised ground to sink to the general level. In many parts of the epicentral tract there was a disturbance of natural features which was obvious to the eye. Reports began to come in which suggested that there had been radical changes in the whole level of the country. At the end of January, the Commissioner reported that a river of considerable size in the north-east of Muzaffarpur had completely disappeared, and that an important embankment, 8 to 13 feet in height, had vanished. The geological experts indicated that there was nothing improbable in levels being altered by seven or eight feet owing to the settlement of alluvial soil during the earthquake.

Evidence of this nature could not be neglected in a tract where rivers liable to violent floods debouch from the Himalayas on to flat country and a very small change in level is sufficient to divert a river many miles from its proper course.

The local Government invited the assistance of the Survey of India. Lt.-Col. Phillimore, Director of the Geodetic Branch of that department, came to Patna and discussed with the local Government the best means by which it could be ascertained whether serious changes had occurred, in sufficient time to enable precautions to be taken before the monsoon. It was impossible to measure such changes in a comprehensive manner, because the number of existing bench marks was limited. There were two lines of bench marks. One ran from Bagaha through Motihari and Muzaffarpur to Darbhanga, and the other went from Bagaha through Raxaul and Sitamarhi and joined the other line at Darbhanga. The line then continued across the Kosi to Purnea. It was decided to undertake a checking of these levels and it was believed that the results would give an indication of any general change which had occurred. In the Sitamarhi and Muzaffarpur areas, lines of levelling were to be run at five mile intervals across the country, with closer levelling in particular areas. Survey parties were organized and the work of checking the levels along these lines began early in March. The field work was completed at the end of April and the data compiled by the Survey were in the hands of the local Government at the end of May. Preliminary results had already been communicated.

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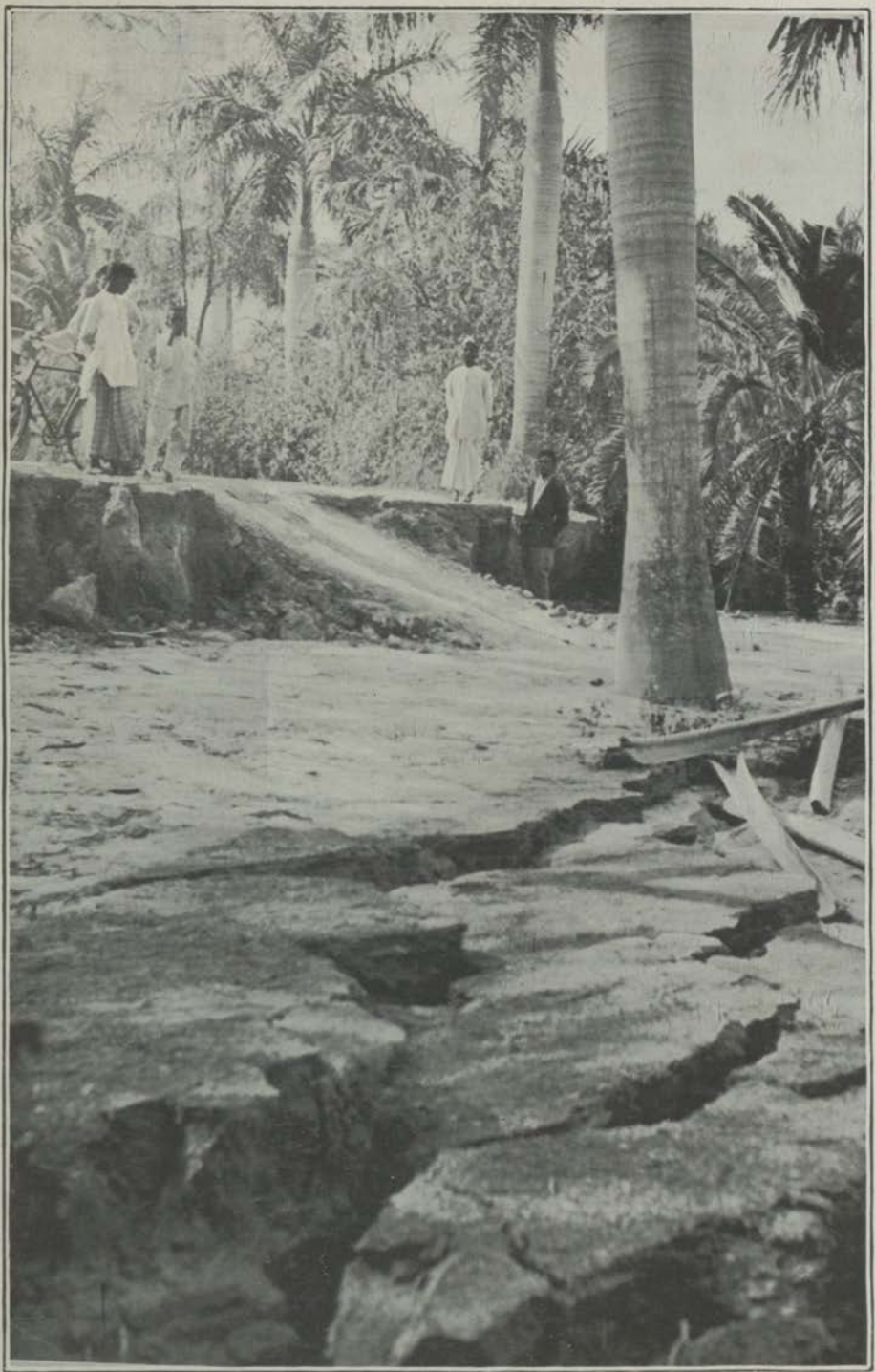


Subsidence in a garden at Muzaffarpur. This was level ground before the earthquake.

The line through Raxaul and Sitamarhi runs diagonally across the epicentral area of the earthquake. Those of the bench marks which were placed on masonry structures were often found to have sunk independently of the general ground level. But "interred" bench marks existed at each of the railway stations along the line and these afforded a more reliable indication of the extent to which the actual surface level had altered. From Ramnagar to Ghorasahan, where the line enters the slump area, falls in level varying from 3 to 10 inches had occurred. The fall was only a few inches at the river Bagmati, on the edge of the epicentral tract. Sitamarhi, some 16 miles further east, had sunk nearly two feet. To the east the drop was slightly less, but further on, at Jogiara, 20 miles east of Sitamarhi, a fall of 2.8 feet was recorded. After this the sinkage was less, and at the junction with the other line at Darbhanga, the drop was 1.8 feet. On the southern line of levels, it was only possible to identify the bench marks at greater intervals and many of these marks had subsided owing to the sinking of masonry into the soil. The measurements which were made showed that there had been a drop of about 18 inches at Motihari, 8 inches at Muzaffarpur and 1.8 feet at Darbhanga. West of Darbhanga the sinkage on the line connecting that place with Purnea varied between one and two feet.

The results of the survey of levels were thus reassuring. As far as they went, they indicated that the country had tilted very slightly to the south east, which is the general line of the drainage. A shallow pocket seemed to have formed near Sitamarhi and the east of that place. But, though the survey did not reveal any catastrophic changes of level, this result did not preclude the possibility of local changes which might divert the rivers or induce water-logging.

The monsoon broke soon after the report was received and the course taken by the floods supported the conclusion that no very serious change had taken place in the levels. There was a marked disposition for floods in the central and eastern portions of the Muzaffarpur district to disperse more slowly than in the past. In this area the river Bagmati has left its old course—a result which may be due to changes in levels.

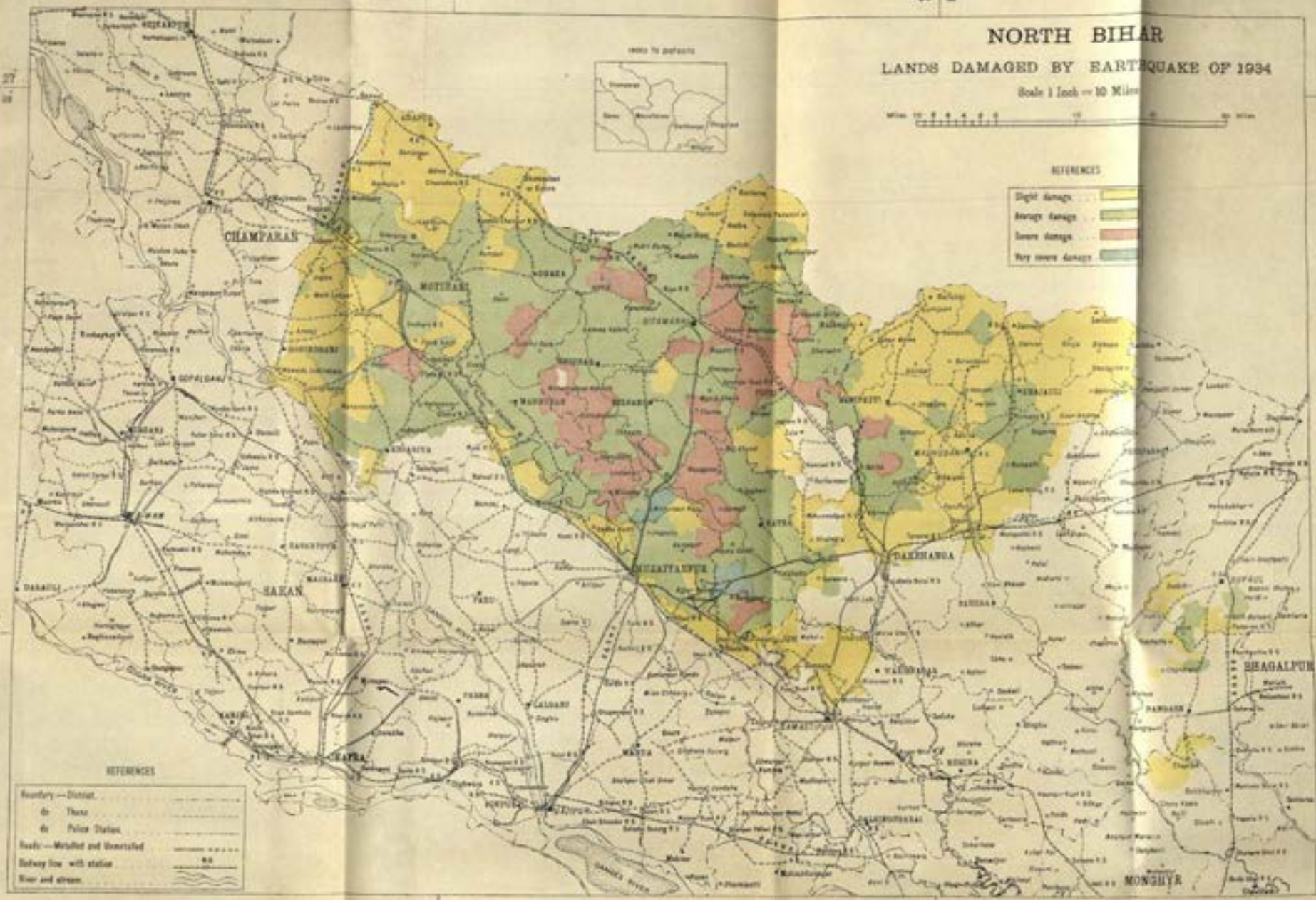
Danger of flood.

36. Though the apprehension of wholesale alterations in the courses of the rivers fortunately proved to be groundless, it was known that the river beds had been choked with sand. The banks had contracted and it could not be expected that a normal rainfall would be carried off as quickly as it had been in the past. It became necessary to employ special staff to watch the situation and to

examine the behaviour of the waterways, not only with reference to floods, but also to supply data for use in connection with the reconstruction of those roads which cross the lines of drainage. A separate Waterways Division was constituted under an Executive Engineer of the Irrigation Department, lent by the Government of Bengal. His duties were to examine the behaviour of the rivers during the rains. He was also charged with the responsibility for advising on applications for permission to re-excavate drainage channels and to repair embankments.

Preparations for flood rescue work.

37. The anticipation that the normal monsoon floods would be more serious than usual made it necessary to devise a special organization for flood rescue work. It was quite uncertain where floods would occur, and the precarious state of communications, with the main bridges patched up for temporary use, rendered the provision of boats essential. At the end of March instructions were issued to the district boards to prepare a large number of boats and Government promised to meet the cost of constructing and maintaining them. In all, over 300 boats were constructed by the district boards. Another 100 boats were constructed at Patna in order to relieve the strain on the local boat-builders, and transported by rail to the Sitamarhi subdivision. The Bihar Central Relief Committee co-operated in the enterprise, and supplied a further 100 boats. An elaborate organization was worked out by which the boats were stationed in groups at strategic points from which they would be able to reach flooded areas. Crews and relief workers were organized, and arrangements were made whereby stocks of food and clothing could be made available for villages cut off by flood or for refugees who had been removed from their homes. The boats varied in size, but the most useful type was found to be a small country boat twenty feet long and five feet in beam, able to float in fairly shallow water and to carry twelve to fifteen persons. For more rapid transport two motor boats were obtained. One was a twenty-foot launch drawing eighteen inches of water. This was found useful for rapid inspection work along the rivers. In anticipation of work in shallow flooded fields a motor boat was constructed consisting of a metal flat, on which was mounted an aeroplane propeller driven by a motor-car engine. This craft was able to work in very shallow water and made good progress against the wind. But it was found that, with a following wind, the boat failed to develop any power. As the prevailing wind during the monsoon is east and the rivers flow from the north-west the boat was not a success. Aeroplanes had been found to be of great use for reconnaissance purposes immediately after the earthquake. It


NORTH BIHAR
LANDS DAMAGED BY EARTHQUAKE OF 1934
Scale 1 Inch = 10 Miles
REFERENCES
Slight damage
Average damage
Severe damage
Very severe damage
CHAMPARAN
MOTIHARI
GOPALGANJ
SIWAN
SARAN
HAJIPUR
MUZAFFARPUR
DARBHANGA
BHAGALPUR
MONGHYR
REFERENCES
Boundary — District
do Thana
do Police Station
Roads — Metalled and Unmetalled
Railway line with station
River and stream

was decided to use aerial observation during the floods, so that the relief operations could be directed rapidly to the points where help was needed. Arrangements were made with Indian Airways, Ltd., Dum Dum, to hold an aeroplane in readiness for despatch to Muzaffarpur whenever required.

38. The event proved the necessity for these arrangements. The monsoon started with a fall of about 3 inches at the beginning of June which, while not enough to cause floods, did a great deal of good in helping the rivers to scour out their channels and remove some of the sand which had accumulated in them. In the middle of July serious floods occurred along the Bur Gandak and Bagmati rivers. They were caused by extremely heavy rain in the foot hills and in Champaran. They passed through Champaran fairly rapidly, but flood conditions prevailed for an extended period in the country north of Muzaffarpur and it was clear that the changes caused by the earthquake had increased the amount of water-logging. A number of villages north of Muzaffarpur were completely flooded and had to be abandoned by their inhabitants who were brought in to Muzaffarpur for temporary shelter. The aeroplane was used for reconnaissance by the Commissioner and resulted in the obtaining of accurate information of the whole situation in a few hours. The organization of boats was fully tested and came through the test extremely well. **Events in the monsoon.**

Some of the important roads which had sunk in the earthquake remained breached for several weeks during the monsoon. This had been anticipated, and a large number of *milnis*, or wooden flats capable of carrying motor cars and other vehicles, had been constructed and kept in readiness. By these means it was possible to maintain communications over most of the affected area.

When the floods subsided, it was found that about twenty village sites to the north of Muzaffarpur had become uninhabitable. In some cases the mounds on which the houses were built had subsided, but the chief reason was that the river Bagmati now tends to leave its bed and flood new areas. A scheme for the removal of these villages to safer sites has now been prepared. It will be financed jointly by the Viceroy's Earthquake Relief Fund and the Bihar Central Relief Committee.

CHAPTER X.

The sand deposits.

The survey of sand deposits.

39. The treatment of agricultural land which had been covered with earthquake sand was, to all appearance, the most menacing of the problems which faced the local Government. The soil of Tirhut supports a purely agricultural population of 830 persons to the square mile. A serious deterioration of the soil must spell starvation to very large numbers and it is not surprising that wholesale emigration was suggested as the only remedy.

A rough idea of the deposits had been obtained by aerial observation, but this method gave little indication of the depth of the deposits. Most of the sand was of a very fine grey texture and, when wet, was hardly distinguishable from the normal grey soil of Tirhut. More accurate information was necessary before remedies could be devised or applied. Early in February orders were issued that each village watchman should report the proportion of land in his village which was affected by sand. This information was obtained for the purpose of showing what tracts should be subjected to detailed survey. It was not anticipated that the reports would be accurate enough for any other purpose. When these reports had been compiled and transferred to a large scale map, it was found that an area of about 4,000 square miles was seriously affected. This area extended from the Nepal frontier on the north to the line Motihari, Muzaffarpur, Darbhanga on the south. After an experimental survey of a few villages, it was found that the only practicable method was for the surveyors to estimate by eye the proportion of each plot which was affected by sand. They measured the depth of the deposit in each field, and classed it in one or other of the following classes :—

I. Less than six inches.

II. Six inches, but less than one foot.

III. One foot, but less than two feet.

IV. Two feet and over.

By reference to the area of each plot as recorded in the settlement papers, the area and depth of the sand deposit could thus be determined.

Eleven circles were organised, each with 12 to 15 surveyors under a circle officer. Work started on the 10th of March and closed in the last circle on the 28th of May.

In all, six million plots lying in 4,152 villages and covering 4,137 square miles were surveyed. Fifteen per cent, or 615 square miles out of this area were found to be affected by sand. Of this 615 square miles 7 per cent contained deposits of less than six inches. 52 per cent was below one foot. Deposits of over one foot covered 37 per cent, or 227 square miles, and 4 per cent or 24 square miles had deposits of over two feet.

Effect of the sand deposits.

40. These results showed the inaccuracy of the alarmist reports that vast tracts had been turned into deserts. In some respects, the conditions were less serious than the bare statistics would seem to indicate. The deposits tended to occur in long swathes, lying on either side of the fissures from which they had been ejected. The average cultivator in North Bihar holds his land in numerous plots scattered over the village, so that in the great majority of cases, the sand deposits, even if they were uncultivable, only threw out of cultivation a small fraction of each cultivator's holding.

Sand damage occurred in various parts of North Bihar outside the area surveyed, but not on a scale which gave reason to apprehend any serious deterioration of the fields. In South Bihar, sand only appeared in a few isolated places.

The actual damage which was done to standing crops by the sand deposits was much exaggerated. At the time of the earthquake, the paddy crop had been harvested. The spring crops and the bulk of the sugar-cane crop were standing. Low crops, such as *masuri*, gram and the like were in some cases smothered by sand and destroyed, but crops which were tall enough to protrude above the sand suffered little damage.

The extent to which the sand deposits were likely to interfere with future crops was unknown. The only previous instance which could be traced was a mention of sand deposits in connection with the Assam earthquake of 1897, but unfortunately, no record could be found of the way in which these deposits had been dissipated. There were two schools of thought. One regarded the sand as an alien substance which had to be removed before the fields could be cultivated. The other school inclined to the view that the sand was one of the normal constituents of the North Bihar soil and that natural forces would soon amalgamate it with the soil.

Investigations into the sand deposits.

41. The officers of the Agricultural Department, immediately after the earthquake, had been faced with the problem of clearing an experimental sugar-cane station close to Muzaffarpur, which had been covered with a thick deposit of sand. They made the soil fit for immediate cultivation by scraping the sand off the surface with a specially devised scraper drawn by bullocks, until it was not more than six inches deep, dumping the excess sand on waste land and

ploughing in the remainder of the sand with ploughs of modern design. On the basis of these experiments, they designed a simple set of implements by which a cultivator could apply the same methods to his fields. At the same time, they conducted analyses of typical sand deposits, which showed that the sand was devoid of the physical and chemical characteristics which promote the growth of plant life. Experiments were also made into the growth of various crops in mixtures of sand and soil, which also gave unfavourable results. The advice which the expert advisers of Government gave therefore tended to suggest that before sanded fields could be rendered cultivable, it was necessary to remove the bulk of the sand, mix up the balance with the soil, and treat the fields with green manure and compost.

In March, Government deputed Dr. K. S. Caldwell, Principal of the Patna Science College, to investigate the sand deposits from a more general point of view. Dr. Caldwell's general conclusion was that the sand deposits did not represent an alien element extruded from great depths, but that they were a normal constituent of the soil. After examining the phenomena on the spot, he pointed out that the evidence strongly supported the view that the upper layer of soil is normally about 20 feet thick. Below it comes a layer of dark earth about a foot thick and a thin layer of light coloured clay. Below are beds of water-bearing sand. The oscillations compressed the water-bearing sand against the upper layer of soil with great violence. The soil was bent upwards till it cracked into long fissures, through which the water and the finer particles of sand were forced to the surface. The comparative thinness of the soil layer explains why it was that sand tended to find its way to the surface through wells and excavations in the surface soil. A heavy embankment or building would naturally tend, by reason of its weight, to cause sand to be ejected and to sink into the soil. By digging in an area covered by geyser openings, Dr. Caldwell found that these formations occurred along lines where fissures had not reached the surface and the sand and water had to force its way through the last layer of soil. This explains why the geysers seldom ejected great quantities of sand. Examining typical fissures, he found that the coarser sand was only found in close proximity to the opening of the fissure. A few yards away was found a light grey coloured sand of fine texture, the chemical nature of which is not very different from that of the average soil, with a small admixture of silt.

These investigations, while throwing a most interesting light on the causation of the sand deposits, gave reason to hope that the problem was not so grave as had been feared.

A sugarcane field damaged by sand

42. If any monetary help was to be given to cultivators, it was necessary to do so before the rains. The work of enquiry and distribution could not be completed in less than 2½ months, even with the very large staff which was utilized. Early in March Government decided to issue loans to substantial cultivators and free grants to small cultivators to enable them to recondition their fields. The loans bore interest at 6¼ per cent, were free of interest for the first year and were repayable in six years. They were granted on a system of joint bonds, groups of eight or more cultivators taking the loan on their joint and several responsibility. The amount admissible was fixed on the area of each holding covered with sand. A cultivator was allowed to borrow Rs. 35 for each acre covered with sand more than 2 feet in depth, Rs. 30 when the deposit was between one foot and 2 feet, Rs. 20 when it was between six inches and a foot and Rs. 10 when it was less than six inches. A cultivator who held one acre or less received a free grant on the same scale instead of a loan, while those whose holdings were between three acres and one acre were given half the money as a loan and the other half as a free grant. **The distribution of money for clearing sand.**

Camps were organized for the distribution of these loans. As the survey officer completed a group of villages his records were passed on to the loans officer. This officer took the applications, verified the title of the applicants and made out the bonds. A disbursing officer followed and made the actual payments. The operations had necessarily to be conducted at great speed. Their magnitude was such that sufficient regular officers could not be secured. Fifteen educational officers volunteered for the work, which fell in the summer vacation, and, in addition, a number of temporary officers were recruited in the locality. It had originally been intended to issue three-quarters of the amount of the loan as a first instalment and to give out the balance before the rains only to those cultivators who utilized the first instalment for its proper purpose. It was soon found that there was insufficient time to enable the officers to pay a second visit to each village before the rains, and the disbursement of the second instalment was deferred until after the rains. Ultimately it was found that so little of the money had been utilized for sand clearance that Government decided not to give out the final instalment at all.

Along with these operations, a series of demonstration parties was organized by the Agricultural Department to demonstrate to the cultivators the sand clearance methods worked out by the department. A supply of 400 ploughs and scrapers was obtained (the ordinary cultivator's plough does not turn over the soil enough

to plough in the sand) and offered for sale. Very few were purchased and it was then decided to lend the implements to the presidents of chaukidari unions, who were expected to see that the villagers used them. A sum of Rs. 15,450 was provided by the Viceroy's Earthquake Relief Fund for the purchase of green manure seed. 1,300 maunds of sunn-hemp and 800 maunds of *dhaincha* were distributed and cultivators were instructed in their use. Compost-making demonstrations were also organized.

The extent to which cultivators availed themselves of the loans and grants differed greatly. In Champaran, Rs. 10,66,153 was distributed in loans and Rs. 44,199 in free grants. In Muzaffarpur, there was initially a disinclination to take loans on joint security. This was overcome and the final distribution in this district was Rs. 13,17,689 in loans and Rs. 1,75,037 in free grants. In Darbhanga, where the damage was less severe, only Rs. 96,004 was issued in loans, and the sum given in free grants was Rs. 1,94,292. In this district fraudulent devices of all kinds were employed to establish a title to receive a free grant, and it is probable that a number of the recipients had very slender claims to receive such grants.

Effect of the sand.

43. As the year progressed, it became evident that the forces of nature were more efficient than human effort in restoring the land. In some instances extensive clearing operations were undertaken by planters and others, to enable them to plant the sugar-cane crop. The cultivators in certain areas scraped off the sand, but in general, most people did little and awaited the monsoon. The strong summer winds did a certain amount to scatter the deposits, while the monsoon rains did more. Evidence began to accumulate that certain crops grew better in sand, provided that their roots could reach the soil below. Even where the deposits are deep, it is exceptional to find land left entirely uncultivable. For heavy paddy lands, a mixture of sand is a positive improvement. Though much land of lighter texture has undoubtedly deteriorated, the deterioration is not complete, it is not likely to be permanent, nor is the extent of land affected so great as to constitute a serious economic problem.

Though only a small portion of the money given for sand clearance was actually spent on reconditioning the land, its distribution was of incalculable advantage. It came at a time when the psychological shock of the earthquake had resulted in a general state of despondency which induced the cultivators to sit idle and to refuse to pay rent and taxes. The distribution put money into the pockets of the cultivators at a time when there was a disposition

to refuse credit, enabled them to repair their houses, pay their rent and resume the normal course of their lives. Fortunately, the rains of 1934 were well distributed. In many parts of Tirhut the winter rice crop is of an excellence which has not been known for years. In contrast to the anticipations of famine and distress in which propagandists indulged so freely after the earthquake, the condition of the cultivators is now distinctly favourable.

CHAPTER XI.

Marketing of the sugar-cane crop.

The danger to the sugar-cane crop.

44. The principal crop standing at the time of the earthquake in Tirhut was the sugar-cane crop. On the money which they receive for their cane the cultivators rely to meet those charges which they must find in cash. Much of the cane is grown under an agreement with a factory, but considerable quantities are grown as a speculation, and sold where the cultivator can get the best price. Some of the cane is carted direct from the field to the factory; much is carted to a railway station and despatched from there to the factory. Sugar-cane, once it has been cut, cannot be left uncrushed for more than four or five days.

The earthquake damaged seven of these factories so severely that there seemed to be no prospect of their working again during the season. Two other factories might with difficulty be repaired in time. It was estimated that these factories would have crushed 15 million maunds of sugar-cane; subsequent events showed that this figure was too high. Their disablement appeared to mean that the cultivators would lose the whole of this crop, worth nearly 40 lakhs of rupees. A loss of this magnitude, added to the loss of the profits derived from carting the cane, would have been a catastrophe of the first order.

The crushing season begins in November and ends in May. If remedial measures were to be effective, they had to be taken at once. The measures which were taken were two-fold. One set of measures aimed at helping the cultivators to turn their cane into a marketable product on the spot. The other was designed to facilitate the sale of the cane to factories outside the earthquake area.

It is possible to produce a form of sugar, known as *khandsari* sugar, by the use of small power-driven plant. Government announced that they were willing to lend money at 2½ per cent to persons who were ready to buy and work *khandsari* sugar plant. A certain number of these plants were obtained and loans amounting to Rs. 79,400 were issued. This measure was not expected to have a very marked effect on the situation.

The provision of mills and pans.

45. Though the crushing of sugar-cane by bullock-driven mills, and the boiling down of the juice into jaggery or *gur*, is common

in areas where factories do not exist, this method had died out in Tirhut when modern sugar factories came to be developed there on a large scale. There were no bullock-driven mills in Tirhut and cultivators had largely forgotten how to manufacture *gur*. The manufacture of *gur* is less profitable to the cultivator than sale of the cane to a factory. The Director of Industries was placed on special duty and instructed to obtain and distribute mills and boiling pans. The whole of Northern India was searched for these implements and some were obtained from distant places in the Punjab. In all 3,286 mills and 3,089 pans were distributed in Tirhut and 183 mills and 183 pans in North Bhagalpur. Of these, 1,250 were obtained on hire, and the balance were purchased. There were manufacturing difficulties at Jamshedpur where a large proportion of the pans were made and this immobilized a proportion of the mills. The total cost of the mills was just under two lakhs of rupees and the freight Rs. 65,000, charges which were first debited to the Viceroy's Earthquake Relief Fund, but subsequently met by the Government of India. The mills and pans began to arrive in the third week of February. A special staff of five officers was employed in their distribution. It was the intention to distribute the mills on the basis of the amount of cane in each area which would have been sold to the damaged factories. There was no record of the actual amount of cane standing in each area. But the position was in a state of constant flux and, in consequence, the mills could never be employed to their full capacity. Some of the damaged factories were able to resume crushing sooner than was anticipated, and, when this occurred, the mills supplied in their vicinity had to be collected and redistributed in other areas. As the operations of the Cane Marketing Board extended, cultivators who had been supplied with mills gambled on their cane being sold by the Board and did not use the mills. In spite of these difficulties, the mills proved of inestimable assistance in solving the problem. With the help of demonstration parties organized by the Agricultural Department, the cultivators turned out good *gur*. At the end of the season the price of *gur* rose to Rs. 3.4 a maund, nearly double its former figure, and, helped by a freight concession granted by the railways, the cultivators were able to sell their *gur* to advantage. The operations closed with the recovery and return of all the hired mills within the period allowed in the hiring contract. The purchased mills and pans were left to be sold gradually. Before the end of the season, five of the damaged factories resumed crushing and took off a considerable quantity of the cane. One of these factories received a loan from Government to facilitate its repair.

The Cane Marketing Board.

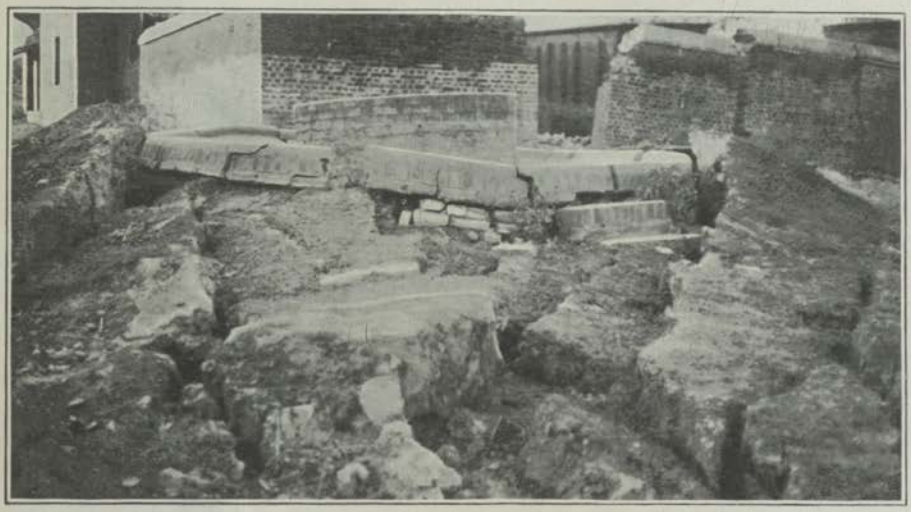
46. Immediately after the earthquake an appeal was made through the Indian Sugar Mills Association to all undamaged mills requesting them to increase their crush and take cane from the affected area. The response was disappointing and it was clear that organization was necessary. The railways, led by the Bengal and North-Western Railway, offered the low rate of freight of one-tenth of a pie per maund per mile on cane. It was soon found that the agents of certain factories were exploiting the needs of the cultivators and buying cane at extremely low prices. At the instance of the Commissioner of Tirhut, a Cane Marketing Board was formed. The special freight rates were confined to cane handled by this body. The Board became the sole selling agent for the surplus cane. It was able to bargain with factories, allot to each the area from which transport was most economical, secure railway wagons and maintain a price which paid the cultivators. The Board had to contend with serious difficulties. The distance to which it could transport cane was limited, since cane dries up if left too long in the wagons. The long railway journeys absorbed a large number of wagons. Owing to the damage to the line, the wagon supply could never be made sufficient to transport all the cane for which offers were received, though large numbers of wagons were borrowed from the other metre gauge railways.

In all, the Board sold 2,576,107 maunds of cane. All orders were pooled and the proceeds divided among the cultivators. An initial payment of four annas a maund was made to the cultivators, and after the accounts had been made up, the Government of India made a grant of Rs. 22,000, which, with the savings of Rs. 18,000 in hand, enabled a final payment to be made at the rate of 3 pies a maund. The operations of the Board were markedly successful. The price which the cultivators received was not much below that which they would have obtained in the normal course.

Success of the operations.

47. The general result of the cane operations was that when the season came to an end early in May, Champaran had been entirely cleared of cane. In Muzaffarpur, only 100,000 maunds remained uncrushed. In South Darbhanga a slightly larger quantity was left. It was only in North Darbhanga that any appreciable quantity was left. 900,000 maunds remained uncrushed in this area. Much of this was of poor quality and the result was largely due to the fact that cultivators, hoping to sell their cane to a factory, did not make full use of their bullock mills.

Accurate figures are not available, but it is estimated that the bullock mills supplied by Government and private agencies crushed about 3,250,000 maunds, and that the damaged factories crushed 2,500,000 maunds.



A masonry well destroyed.

Fissures on the Sitamarhi road.

CHAPTER XII.

The water-supply problem.

48. It has been explained in an earlier chapter that water-bearing sand was expelled in great quantities from the wells. This phenomenon occurred not only in the epicentral tract, but also in places where there was little or no ejection of sand through fissures. The wells over a very large area were left choked with sand, and the inhabitants were driven to obtain their drinking water from streams or tanks. The circumstances favoured the outbreak of epidemic diseases among a population already weakened by privation. **The damage to wells.**

49. In the earlier stages, the sinking of small Abyssinian tube-wells, costing about Rs. 50 each, seemed to be the only practicable remedy. The Mayor of Calcutta devoted Rs. 50,000 of his fund to a programme which aimed at sinking 1,000 of these wells in the villages of Champaran, Muzaffarpur and Darbhanga. The sinking of the wells was carried out by Mr. A. D. Hall, an engineer lent by the Public Health Department. The programme was closed in the middle of June, when it was found that the proportion of failures was increasing. Mr. Hall sank 903 of these wells successfully, 303 in Muzaffarpur district, 200 in Champaran, 300 in Darbhanga and 100 in Saran. A considerable number of additional wells of this type were sunk by the municipalities and district boards, by the Bettiah and Darbhanga estates and by the private relief societies. The Bihar Central Relief Committee reported that they had sunk over 300 tube-wells. **Tube-wells.**

Though these tube-wells were of very great value in supplying the immediate need for pure drinking water, they have certain disadvantages for village use. The quantity of water which they supply is smaller than that given by a surface well, and the pump is liable to be broken by the rough and inexpert handling which it is likely to receive in a village.

50. It was found that, in most cases, the surface wells could be reconditioned by removing the sand. In fact, it was noticed that they often gave better water after this process than they did before the earthquake. At first the villagers were afraid to go down the wells to clear them, while in many instances they preferred to wait till some Government or relief society agency came and did work which they could easily have done for themselves. **Repair of surface wells.**

Small grants of money given by the Viceroy's Earthquake Relief Fund were distributed by touring officers to enable wells to be cleaned by the villagers. As time went on, the campaign for the improvement of the water-supply took the form of cleaning old wells and constructing new surface wells where the old wells had been damaged beyond repair. This work was done chiefly through the agency of the district boards. Grants, debitable to the reconstruction grants, were made by Government to the district boards and municipalities for this purpose. In Darbhanga the grants were placed directly at the disposal of the District Officer, because it seemed unlikely that the district board could complete the work in time. Mention should be made in this connection of the "Engineer Scouts" a body of students from the Bihar College of Engineering, which was organized by Sir Courtney Terrell, Chief Justice of the Patna High Court. These youths went into Tirhut and were invaluable in carrying out small engineering jobs at isolated places which the regular staff of the district boards could not find time to do.

The clearing of wells and the sinking of new wells was taken up by the various relief societies. Between them they claim to have dealt with very large numbers. The Bihar Central Relief Committee carried out a large programme of repairs and construction. Their published accounts show an expenditure of Rs. $4\frac{3}{4}$ lakhs under this head.

The crisis brought to light fresh methods of well-sinking. In certain parts it is the custom to make wells of clay rings, which can be sunk without using a curb. These wells are cheap and very quickly constructed. They were sunk in many parts of the area, wherever potters could be found who knew how to bake the rings.

As the summer advanced, it was reported that many wells which had been cleared were again going dry. In some cases, cracks in the masonry allowed the ingress of fresh sand, but in most cases the drying of these wells was due to the fact that in the initial operations only sufficient sand had been removed to give water at the time. The sub-soil water level was much higher than usual after the earthquake. It sank to normal or lower in May and June and fresh excavation was required.

Generally speaking, the measures taken were adequate to restore the supply of drinking water to a reasonable degree. Special attention was paid to the chlorination of wells. Though cholera was prevalent during the summer, its incidence was by no means confined to places where the wells had been choked.

A court building at Muzaffarpur.

Judge's house at Muzaffarpur, before the earthquake.

The same house, after the earthquake.

CHAPTER XIII.

The reconstruction of Government property.

51. The book value of Government buildings destroyed by the earthquake was about 42 lakhs of rupees. The cost of replacing them cannot be stated exactly. It will greatly exceed the book value, because many of the buildings which collapsed dated from a period when building was cheap. The cost of repairing those which did not collapse is estimated at Rs. 22 lakhs. **The damage to buildings.**

The damage differed considerably at different places. In Patna and Bhagalpur it was chiefly old buildings of inferior construction which collapsed. Well-built brick buildings generally stood the shock well. They suffered damage but seldom needed complete reconstruction. Except for the High Court, the reinforced brick buildings in the New Capital area suffered surprisingly little damage. The massive building of the old East India Company's Factory at Gulzarbagh was badly damaged. Even at Monghyr a number of buildings escaped destruction. In the slump area, little survived. At Motihari and Sitamarhi practically every building was wrecked and the movement of the earth destroyed the foundations and shattered even well-built modern buildings. At Purnea the slumping of the soil caused buildings to sink and tilt. At Muzaffarpur and Darbhanga, modern buildings often survived, if their foundations were not disturbed by fissures, while the older buildings collapsed.

52. A general question which had to be settled at once was the extent to which new construction should reckon with the probability of future earthquakes. Though there was much propaganda in favour of types of building which were claimed to be " earthquake-proof ", the manner in which well-built single storey buildings of brick had stood up indicated that in most places no radical change was necessary. The decision was to build in brick, but to incorporate reinforced brick bands in the structure at the points of weakness and to use lighter roofs. In the slump areas, where the instability of the soil rendered it particularly necessary to reduce foundation pressures, it was decided to use steel-framed structures with light walls and with light roofs supported on steel stanchions. **Method of reconstruction.**

South of the Ganges, there was no indication that the earthquake had rendered the soil unstable. Few changes of site were necessary, and nothing hindered the commencement of work

except the inevitable delay in getting out new plans and estimates and collecting materials. Repairs were practically completed by the end of the rains of 1934, and new construction was started early in the winter of 1934-35.

In Tirhut and in Purnea, though repairs were completed in those buildings which were capable of repair, new construction was held up by various factors. Almost everywhere, the fissuring and slumping of the soil and the ejectment of sand made it unsafe to build at all until soil stability had been tested by the monsoon. Hence, in many cases, it was not possible to decide either where buildings were to be sited or the exact nature of those buildings. In many cases, buildings which were apparently capable of repair had to be watched. For example, the jail at Madhubani had to be condemned in September, because soil movements rendered the buildings unsafe, though immediately after the earthquake, they appeared to be reasonably safe.

Necessity for moving certain headquarters.

53. Projects for the wholesale movement of administrative centres, and even of whole towns, were put forward freely. It was recognized by Government that the inhabitants were extremely unlikely to desert the old centres of population. The removal of the courts and offices must inflict a grave loss on vested interests. Unless they were fully satisfied that it was impossible to rebuild on the old sites, Government were unwilling to sanction wholesale transference of administrative buildings. Consequently, it was not possible to decide finally on these proposed changes of site until late in the rains.

Sitamarhi.

At the subdivisional headquarters of Sitamarhi, the Government buildings had occupied a somewhat cramped site at the eastern end of the town, close to a river bank. The site had been completely broken up by fissures; clearly, it could not be used for some years to come and experience had shown the danger of sites near rivers. After a careful search for alternative sites, in consultation with the local residents, had shown that nothing suitable could be obtained closer, it was decided to build the offices and Government quarters at Dumra, about 2½ miles from the old site, and connected with Sitamarhi by a metalled road. The lay-out of the new site was decided in September.

Madhubani.

At Madhubani, though it was possible to use a number of buildings immediately after the earthquake, the local officers considered that it would be necessary to make a clean sweep and to move all the Government buildings to a new site 2 miles away. The amount of sound ground in the town was extremely limited.

Fissures on the bank of the lake at Motihari.
This was formerly level ground.

Fissure in the main street of Motihari.

Ultimately, after a visit by His Excellency the Governor, it was found that it was possible to fit in the public offices and some of the residences near their old sites and to place the rest of the residences, the jail and the hospital on a new site only half a mile away.

Motihari. Motihari, the district headquarters of Champaran, presented a more difficult problem. The old town lay on the banks of two lakes and the fissuring and subsidence of the soil had been extreme. Only a few islands of apparently sound soil could be found, and the real stability of these areas was a matter of grave doubt. After a special inspection by the Chief Engineer in June, it was decided to wait until August before making a final decision. In August, both Chief Engineers inspected the sites again and reported that sufficient area to rebuild the Government buildings could not be found in Motihari. On this report, Government decided to rebuild all the headquarters buildings at Luathaha, a piece of high land, relatively free from fissures, about 3½ miles away. When the Council was asked to vote the requisite financial provision in September, there was strong opposition to the proposal. The local representatives of Motihari interests argued that the Chief Engineers' report was inadequate and that there were other possible sites in Motihari or closer to it than Luathaha. Early in October His Excellency visited the place and after an exhaustive examination of the alternative sites, was convinced that there was no alternative to moving to Luathaha. Plans for the lay-out of the new site were completed and sanctioned in October.

Purnea. At Purnea, the report of the geological experts indicated that the damage done to the buildings was due to the fact that they were built on an old bed of the Kosi river. Though the site is unsatisfactory, no better alternative site was available and it was decided to reconstruct the buildings in a lighter form on the islands of sound ground which existed between the fissures.

By the end of 1934, almost all site questions had been settled, and, in the great majority of cases, plans for the new buildings had reached an advanced stage. Materials had already been collected, and everything was ready for the construction of the new buildings.

Canals and embankments. 54. The Teur and Dhaka canals in Champaran lie on the border of the slump area. Their embankments suffered considerable damage and it was apprehended that changes in level might have interfered with the distributaries. It was found that this was not the case and the damage was restored at a cost of Rs. 1,23,800 in time for the irrigation season of 1934-35.

The Gandak embankment runs along the right bank of the Gandak river and protects the eastern portion of the Saran district. It had been damaged severely at Baikunthpur by the earthquake and a decision was reached to construct a new retired line 7½ miles in length. To construct this work before the rains was a race against time. The earthwork was done just in time and withstood the flood successfully. The cost of this work and of the repair of other earthquake damage to the Saran embankment was 2½ lakhs of rupees.

CHAPTER XIV.

The reconstruction of the property of the local bodies.

55. Except for certain roads in the Patna division, all roads and bridges in the earthquake area belong to the district boards or, within the towns, to the municipal bodies concerned. The district boards maintain dispensaries in the rural areas and either maintain or aid large numbers of schools of various types, together with veterinary hospitals, inspection bungalows, pounds and other buildings. The buildings of the district boards suffered in the same manner as those of Government. As district board buildings are usually small and scattered throughout the district, it was more difficult to organize their repair and reconstruction than it was for Government to deal with a limited number of larger buildings concentrated at the headquarters stations. Nature of the damage.

The district boards are bodies with an elective majority. Their Chairmen are non-officials. Their income is derived from a cess on land, which in practice cannot be increased. The total income of the four district boards of the Tirhut division in 1932-33 was Rs. 23 lakhs, of which Rs. 10 lakhs represented grants received from Government. They have no margin from which to meet unexpected demands for large sums of money. The municipalities are also under the control of elected municipal commissioners. The revenue is derived chiefly from a tax on holdings and a conservancy tax. Their financial condition is usually worse than that of the district boards, and several of them are sometimes close to bankruptcy. Two important municipalities, Patna City and Monghyr, were under suspension at the time of the earthquake. Of those which suffered great damage, only Patna, Muzaffarpur, Bhagalpur and Monghyr have incomes of Rs. 2 lakhs or over, and only Chapra and Darbhanga exceed Rs. 1 lakh.

As soon as the dimensions of the damage became known, it was clear that neither the district boards nor the municipalities could replace their losses out of their own resources. They could not even afford to finance loans for the purpose, since they have no margin from which to meet the service of a loan. The Government of India agreed to bear the whole cost of replacing the damage done to the property of the local bodies. They also agreed to make grants to enable them to carry out their normal responsibilities. This was necessary, because the destruction of

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houses made it impossible to collect a large portion of the tax on holdings, while, at the same time, heavy expenditure was necessary in clearing the towns, adapting the conservancy and lighting arrangements to the new circumstances, and the manifold other activities which the commissioners were compelled to undertake in the general wreckage of the towns. In the districts south of the Ganges, the damage done to the property of district boards was confined to the buildings and some of the bridges and culverts. There was no appreciable damage to the fabric of the roads. It was a comparatively easy matter to ascertain the cost of repairing the damage and to execute the work. It is estimated that a sum of Rs. 10 lakhs will be sufficient to finance all earthquake repairs and reconstruction in these district boards. Most of the work has already been completed. The municipalities south of the Ganges suffered more than the district boards, since more of their property consisted of buildings. In Monghyr the wreckage in the town was extreme and the cost of replacing the damage to municipal property is estimated at Rs. 4¾ lakhs.

Urgency of restoring road communications.

56. In Purnea and, to some extent in Saran, there was an absence of very severe damage to communications. In the eastern half of Champaran, the northern half of Muzaffarpur and the greater portion of Darbhanga, not only was the damage to buildings more severe than in other places, but the roads and bridges were wrecked on a very extensive scale. The nature of the country necessitates the maintenance of embanked roads with numerous bridges and causeways. In the areas mentioned, nearly all the important bridges either collapsed or were seriously damaged. Road embankments sank sometimes to field level. In the flooded state of the country this had the effect of stopping wheeled traffic completely, until the bridges could be patched up. For a considerable period after the earthquake, it was impossible to know the real extent of the damage done in the outlying portions of the districts, much less to take measures for repairing it.

The measures which were taken to restore communications and to clear the towns immediately after the earthquake have already been mentioned. As soon as temporary means of communication had been opened, the most urgent problem which confronted the district boards in Tirhut was to repair the embankments and bridges on the principal roads before the monsoon broke, to a degree which would render it possible for them to withstand the floods. It was fairly certain that extensive relief operations would be necessary in the monsoon. Unless the roads between Muzaffarpur and Motihari, Muzaffarpur and Sitamarhi, and the routes from Muzaffarpur to Darbhanga could be kept open, it would be impossible to

Damage to roads and bridges

reach many of the areas in which danger was feared. Only a little more than three months remained in which to repair a dozen or more major bridges, to obtain the necessary steel work and to get it to the sites at a time of great congestion on the railways. Actually the task was accomplished, and by the end of June all the major bridges on these routes except one had been repaired. Communications were, in fact, kept open throughout the rains, though in certain sections of the roads from Muzaffarpur to Sitamarhi and to Darbhanga vehicles had to be transported on boats.

Apart from the urgent repair of communications, the hot weather of 1934 was occupied chiefly in executing repairs to those buildings which were capable of repair and in the preparation of plans and estimates for reconstructing those which had collapsed. For this purpose the district boards engaged large additional engineering and clerical staff.

Control of the operations of District Boards.

57. The control of expenditure required special attention. In ordinary circumstances, the technical control of the engineering work of the district boards is a part-time function of the Superintending Engineer, who, for this purpose, is styled Inspector of Local Works. The complexity of the work, and the very large sums of money which were involved, necessitated the employment of special means of control. In April detailed orders were issued for the guidance of the district boards. They were told to push on with the repair of all works which were capable of being repaired, if the soil conditions appeared to be reasonably stable. The prior preparation of regular estimates for repairs was not insisted upon, but lists of repair works and their cost were to be submitted to the Inspector of Local Works. If the Inspector considered the figures to be reasonable, the District Officers were authorized to pass the expenditure if it was below Rs. 1,000 in individual cases. Bills for larger items were sanctioned by the Commissioner. For works which required complete reconstruction, a less expeditious procedure was necessary. Regular plans and estimates were required and the approval of the District Officer, the Commissioner or the local Government was necessary, according to the amount of the estimates.

A number of difficult questions of interpretation arose. The general position, upon which Government laid great emphasis, was that works could not be improved at the cost of the Government of India's grants. They could only be restored to their pre-earthquake condition. But in some cases the earthquake had altered river channels, making the provision of increased, or new, waterways essential. In others embankments had sunk, but it was uncertain whether it was really necessary to raise them to their old level.

Sometimes there was no reliable record of what the old level was. To meet some of these difficulties, it was laid down that roads should be reconstructed so as to give the same service as they gave before the earthquake : thus a road or causeway which was normally interrupted in times of high flood could not be rebuilt so as to afford a passage even in the highest flood. A number of the school buildings which had collapsed were old mud buildings, which could hardly be replaced as they stood. For these the rule was laid down that the new building must not exceed the old in plinth area and must be of an approved type plan.

The supervision of the repair and construction work of the district boards required constant inspections, for which the Superintending Engineer was unable to spare time. A separate post of Inspector of Local Works for Tirhut was created in May 1934 and filled by an officer of the rank of Superintending Engineer. At a later date he was given a Personal Assistant and a staff of two experienced Assistant Engineers. It was decided that, as a general rule, the adoption of special earthquake precautions was unjustifiable in reconstructing the small and cheap buildings of the district boards. But these precautions were embodied in the more elaborate buildings and in hospital wards and operation theatres which could not be evacuated hurriedly.

The most difficult of the reconstruction problems of the Tirhut district boards is probably that of deciding how best to reconstruct the important road across the Bagmati river between Muzaffarpur and Sitamarhi. Twenty-four miles of this road sank in the earthquake, twelve miles showing very serious sinking, and there is evidence that the Bagmati river is making a new channel across it. It has been necessary temporarily to hold up reconstruction until the future course of the Bagmati can be determined.

Cost of the operations.

58. It is not possible yet to determine the cost of replacing the damage done by the earthquake to the property of the Tirhut district boards. The best estimate, at the moment, is in the neighbourhood of Rs. 57 lakhs. In the municipalities, the cost of replacing damage and financing their normal responsibilities will probably be about Rs. 23 lakhs. These bodies differ from the district boards in that the earthquake has robbed them temporarily of a large portion of their income. The conditions under which they work were profoundly altered by the earthquake, and new demands arose for clearing the roads and lanes, and supplying water, lighting and conservancy to new colonies of huts. In several towns the whole drainage system was thrown out of action and so distorted that it must be re-designed.

59. A short Act, the Bihar and Orissa Municipal (Emergency Provisions) Act, was passed in February 1934, chiefly to deal with the problem of remissions of taxation. The provisions of the Municipal Act were not suited to the circumstances, and the necessary remissions could not be granted speedily without special legislation. Orders under this Act were issued in April. The principles which were adopted were that where the buildings on a holding had entirely collapsed and were uninhabitable, so that the holding had been vacated completely, there should be remission of all taxes assessed on the value of the holding. Where the occupant was still living on the holding in temporary quarters, the holding tax was remitted, but the water and latrine taxes were realized. Where the damage was serious, but the house was habitable, the holding tax was reduced in proportion to the damage. Municipalities.

In most towns the municipal building regulations, framed under section 195 of the Bihar and Orissa Municipal Act, were relaxed immediately after the earthquake, so as not to impede the erection of temporary shelters and the execution of urgent repairs. At the end of May, the municipalities were advised by Government to reimpose these regulations particularly in the case of masonry buildings. This was necessary to prevent the erection of dangerous houses. Few of the municipalities maintain a qualified engineering staff. Those which were in the charge of one of the Town Engineers were instructed to utilize the services of these officers in passing orders on applications for permission to rebuild. In others, the entertainment of temporary engineers was sanctioned. Each Town Engineer was given a small staff of plan-drawers to whom applicants could come for the preparation of the plan which must accompany the rebuilding petition. The arrangements for the supervision of plans and estimates for the reconstruction of municipal property were the same as those which were applied to the district boards, except that the Town Engineer took the place of the Inspector of Local Works. He was also directed to supervise the preparation of the plans and estimates and the execution of the works.

In financing the local bodies, the system which was adopted was to make advance grants, to be adjusted when more detailed information was available. In some cases, it was possible to make specific grants. The total of grants of both kinds which have already been made to the local bodies, including those made direct to certain hospitals and leper asylums, is Rs. 29,51,000. Further requirements in 1934-35 are estimated at Rs. 18 lakhs and in 1935-36 at Rs. 48 lakhs.

CHAPTER XV.

The damage to private house-property.

Damage in rural areas.

60. While certain of the problems caused by the earthquake turned out to be less serious than they had seemed to be at first sight, the destruction of house-property remained as the greatest and the most universal of the losses inflicted on the people. The extent of the damage differed greatly in different areas; in the same area houses of one type often stood the shock better than others. The most numerous type is naturally the cultivator's hut. In the greater part of the area the cultivators live in huts, the walls of which are made of mud, supporting a roof of thatch or tiles carried on a light bamboo frame work. The walls of these houses often cracked or fell during the shock, and the roof frequently collapsed, but the damage done was of a nature which could usually be repaired without very great difficulty. Over a large part of North Bihar the general type of construction is even simpler. The roof is carried on bamboo uprights and the walls consist merely of bamboo-wattled work plastered with a thin coat of mud. This type of house suffered very little damage. Persons of better position in the villages own houses loosely built of inferior bricks. Frequently the same house is built partly of brick and partly of mud. There are also a certain number of brick houses of a rather better type, but not usually of strong construction. These *kutcha-pucca* houses suffered severely in the earthquake and a large proportion of them collapsed entirely or were rendered uninhabitable.

In towns.

61. In the towns, the houses of the better classes are generally built of solid masonry, frequently of two or more storeys. They are usually of a heavy type of construction without much claim to scientific design. The houses of the middle and lower classes in the towns are usually of brick, but the brick is very often merely laid in mud and is not properly bonded together. It is the custom to build slowly, and the same house will often contain numerous additions of varying date. Even in the large towns, there are considerable numbers of mud huts in the poorer part of the town. In congested bazars the houses are frequently of considerable height. The weak construction of these houses rendered them liable to suffer great damage in the earthquake. Very large numbers collapsed altogether and the majority were rendered unsafe for immediate occupation.

62. But though a very large proportion of the population was rendered homeless by the earthquake, there were certain factors which tended to mitigate the loss. In the villages the cultivator is accustomed to build his own hut. The collapse of a hut seldom involved the loss of the materials except where these were already worn out, and bamboos and thatching grass are plentiful in the country areas. A hut which appeared to have suffered great damage in the earthquake could often be rendered habitable at small cost by the labour of its owner and his family. Moreover, the agricultural population is habituated to sleeping in the open under flimsy structures, and, in fact, when the crops are ripening, a large proportion of the villagers ordinarily spend the night in the fields, watching their crops. Mitigating factors.

In the towns the repair of the houses was a much more serious problem. Even here a large proportion of the materials was capable of being used again, and are being built into the houses again. The greatest hardship was undoubtedly suffered by families of the middle class who were unable to do their own re-building or repairs and were not accustomed to a life in the open.

Though after the earthquake many attempts were made to estimate the number of houses damaged and to compute the financial loss involved, calculations of this nature proved to be of very little value. The houses vary so greatly in their nature and in the amount of damage which they sustained that nothing but a house-to-house investigation by experts could give even an approximate figure. The urgency of actual reconstruction measures made it inadvisable to attempt any such statistical research, which could have been of no practical value.

CHAPTER XVI.

The distribution of financial assistance to private house-owners.

Provision of engineering advice.

63. Immediately after the earthquake a great demand arose for simple engineering advice on re-building. Those houses which were left standing often required an expert examination before the owner could safely execute repairs. It was impossible to meet the whole of this demand, but special advisory engineers were obtained for the purpose of visiting damaged houses and advising the owners what they should do. Rai Sahib Pandit Ram Chandra, an engineer who was lent by the United Provinces Government, did particularly good work in the Tirhut division. The Government of Bengal lent the services of Messrs. Williams and Nunn, who did similar work in the Bhagalpur division. At Patna the officers of the Public Works Department did a great deal of useful work in the city, helped by senior students of the Bihar College of Engineering. The matter was placed on a regular basis when the Town Engineers joined in April. One of their functions was to furnish advice on re-building.

64. It was clear that the provision of financial help was the principal way in which Government could help private owners to reconstruct their houses. Many persons would be able to re-build their houses if they could obtain loans on easy terms. Others, who could not afford to take loans, would require free grants of varying magnitude from the charitable funds. But it was a task of very great magnitude to investigate the cases in which financial help was necessary and to determine the appropriate form which that help should take in individual cases.

The Natural Calamities Loans Act.

65. The lending of money to the general public on the security of house-property was an operation of which the local Government had no previous experience. House-building loans, without special legislation, would have necessitated the execution of mortgages of a complicated form in each case. It was decided to simplify the procedure and to assimilate it as far as possible to the procedure for the grant of ordinary agricultural loans. An emergency Act, the Bihar and Orissa Natural Calamities Loans Act, was drafted and passed by the Legislative Council in the middle of February 1934. This Act provided for the grant of loans to the owners of houses which had been destroyed or damaged by a natural calamity, to be devoted to the repair or re-building of their houses. The special feature of the Act was that the loan was declared to be the

first charge on any house repaired or constructed with the loan and on any interest held by the borrower in the land upon which it stood. The security was thus often a building which was to be constructed after the money had actually been advanced. The rules under this Act were published in the middle of March and loans began to be issued early in April. Two classes of loans were provided. Persons who could not afford to take a loan at all otherwise than from Government were eligible to take loans, not ordinarily exceeding Rs. 1,500, at 4½ per cent interest, repayable in from six to nine years. This class of loan was free of interest or repayment for the first year after the advance of the money. It was believed that this provision would be of greater assistance to borrowers than a reduction in the rate of interest. A second class of loan, bearing interest at 6¼ per cent, and repayable in from twelve to fifteen years, was issued for the benefit of persons in better circumstances, who would ordinarily be able to finance themselves but who found difficulty in raising money at reasonable rates in the general disturbance of credit caused by the earthquake. These loans were not subject to any limit of amount. The amount advanced under either class could not exceed the cost of repairing the house or the value of the original house. Small borrowers were allowed loans up to 75 per cent of the value of the house as reconstructed, while for loans exceeding Rs. 1,000 the limit was 50 per cent of the value of the house.

Rates of interest.

66. There was a certain amount of criticism of the rates of interest, and lower rates were sometimes advocated. These criticisms did not take sufficient account of the fact that the great bulk of the poorer sufferers were given free grants of money. The classes which were allowed to take loans were persons whose ability to repay the loans had been established. The object was to fix rates low enough to be of use to genuine sufferers, and sufficiently high to discourage frivolous applications. A study of the statistics showed that the average borrower regarded the terms as favourable. In Patna district a considerable majority of the applicants for the 6¼ per cent loan applied for sums greatly in excess of the real cost of reconstruction—a result which indicated that they were trying to take the opportunity to borrow money for purposes other than house-building. The administration of the loans necessitated periodical inspection of the houses, and, with a very large number of cases to be dealt with, there was a real danger that money ostensibly borrowed for house-building would actually be lent out at high rates of interest in the bazar. The rate of interest in the ordinary market for loans on the security of houses was about 14 per cent.

Operations under the Act.

67. Considering the urgent nature of the measure and the short time which there was for elaboration of details, the Natural Calamities Loans Act worked smoothly. It was found unsuitable for use in the rural areas, partly owing to legal difficulties, but chiefly because there is no free market for village houses and there is therefore no security that a loan advanced on such a house could ever be recovered by the sale of that house. The largest number of applications was received in Patna and in that district the great bulk of the 761 loans were given out within six months, a result which reflects great credit on the officers who handled the work. In Muzaffarpur and Darbhanga there was a failure at first to apply the principles of the Act properly, and many applications were wrongly rejected because of a mistaken idea that it was necessary to demand security other than the house itself. It became necessary to order that such applications should be reviewed.

The general procedure followed was for a gazetted officer to hold a local enquiry soon after the application was received. He was usually able to decide whether the case was a suitable one for a loan. In the more intricate cases a report was obtained from an engineer. The title of the applicant was verified and enquiries were then made in the Registration offices into the existence of previous encumbrances. This process sometimes took a considerable time, as it involved the examination of twelve years' records. On the completion of these enquiries the loans were granted and the first instalment issued. Subsequent instalments were only given as the rebuilding progressed. In most areas the number of applications for loans under the Act was far in excess of the number of cases in which loans were suitable. It soon became apparent that it was useless to issue small loans of less than Rs. 100 to persons whose security was doubtful, and in such cases the loan was refused and the applicant was given a free grant from the Viceroy's Earthquake Relief Fund if he appeared to be eligible. In the rural areas of Darbhanga, applications were received on a gigantic scale. These were not usually genuine applications from persons who intended to repay a loan, but were due to a mistaken impression that repayment of the loan would not be demanded, or that an application for a loan however unjustifiable would result ultimately in a free grant from the Viceroy's Fund. Ultimately it became necessary to reject the majority of the rural applications on the general ground that the security of an ordinary raiyati house or holding was inadequate. Persons who could offer more negotiable forms of landed security were allowed loans.

In the towns, for which the Act was originally intended, the number of applications was greatly in excess of real requirements,

A temple in Motihari.

The central part of this house sank through the floor half way to the lintels of the doors.

The number of cases in which it was found possible to advance loans was not more than 15 per cent of the number of applications.

68. The sums sanctioned in loans in the different districts on the 31st of December 1934 is given below :—

(In thousands of rupees.)

	4½ per cent loan.	6¼ per cent loan.	Total.
Patna ...	3.16	3.35	6.51
Monghyr ...	1.63	1.20	2.83
Saran ...	99	98	1.97
Bhagalpur ...	70	78	1.48
Champaran ...	79	1.27	2.06
Purnea ...	16	42	58
Gaya ...	26	35	61
Muzaffarpur ...	66	34	1.00
Darbhanga ...	91	46	1.37
Shahabad ...	11	17	28

2,205 loans at 4½ per cent were sanctioned, the greater part being loans of between Rs. 300 and Rs. 500. The number of loans at 6¼ per cent was 821.

Free grants to house-owners.

69. It has already been explained that the needs of the poorer classes were met by the distribution of free grants for house-building from the Viceroy's Earthquake Relief Fund, which was supplemented for this purpose by a grant of Rs. 8 lakhs from the Indian Peoples' Famine Trust. The issue of these grants was by far the most considerable of the relief operations. Immediately after the earthquake the Committee which administered the Viceroy's Earthquake Relief Fund placed at the disposal of each district sums of money which were to be utilized by touring officers in making small grants in cases which came to their notice during their tours. A large part of the grant for charitable and rural relief was spent in small grants of a few rupees each in order to assist the people in repairing their houses.

Operations on a more regular plan were initiated by the decision to set aside large sums to be expended in grants of a more substantial amount. The District Magistrates were directed to investigate cases in which financial assistance in repairing their houses was needed by persons who were too poor to take loans. They were empowered to give grants not exceeding Rs. 300 in any one case,

Persons who could normally be expected to repair their houses with their own labour were not to receive money grants and the District Magistrates were asked to pay special attention to widows and elderly persons and to those whose profession or social status made it impossible for them to repair their own houses.

Difficulty of the enquiries.

70. Enquiries were necessary on a gigantic scale to effect a proper distribution of these grants. It may safely be stated that for each applicant who was given a grant, at least ten other applications were received from persons who could do without help, while gross overestimates of the amount of money required were common. In the towns the work was sufficiently concentrated for gazetted officers, with the help of Honorary Magistrates and municipal staff, to hold house-to-house enquiries and to ascertain the cases in which grants were necessary. But in rural areas, the task was of much greater magnitude. The method adopted in most districts was to cause the chaukidari panchayats to frame lists of suitable recipients and then to depute officers to go through the villages and test these lists. Where these officers found, after examining a few villages, that the list was generally reliable, they paid out the sums recommended for the circle without further tests. But where the tests indicated that the lists could not be trusted, further enquiries became necessary. It was a matter of considerable difficulty to ensure that the grants were administered on the same principles in different districts, or even by different officers working in the same district, and it was unavoidable that there should be some discrepancy in this matter. There was in some districts too great a tendency to hold up the actual distribution of the money until enquiries were complete in a particular area, a method which led to duplication of work. The better method was to allow the enquiring officer to pay out the grants immediately he was satisfied that a claim was a genuine one. There were 24,226 cases in the towns, and 202,539 in the villages.

Sum distributed.

71. The total amount distributed in the different districts in this form of grant was Rs. 27½ lakhs, of which Rs. 10¾ lakhs was distributed in the towns. The average grant in the towns was Rs. 45, varying from about Rs. 30 in Saran and Darbhanga to Rs. 85 to Rs. 90 in Muzaffarpur and Purnea. In rural areas, the general average was Rs. 8: this was due to the distribution of very small sums in Darbhanga and Champaran. Elsewhere the average was between Rs. 15 and Rs. 30. In view of the great extent of the damage, the average may seem low, but it is largely explained by the fact that the repair of a mud house of the ordinary type is not a very costly enterprise.

The amount expended in each district on this type of grant up to the 31st of December 1934 is given in the following table :—

(In thousands of rupees.)

	Urban.	Rural.
Patna	2,37	87
Gaya	11	11
Shahabad	8	12
Monghyr	2,10	22
Bhagalpur	72	1,38
Purnea	7	1
Muzaffarpur	2,51	2,37
Darbhanga	1,38	5,78
Champaran	99	4,69
Saran	55	1,30
Total ...	10,88	16,85

Grants to middle-class families.

72. The principle which the Committee followed in giving these grants was to lay down the qualifications which justified a grant and to provide as much money as was necessary to finance a distribution to all persons who had those qualifications. It was realized that though this type of grant was suitable for the lower classes, whose houses were of a simple nature, the sums given were too small to be of much use to persons of better status, occupying more costly houses. At the same time, it became evident that the middle class had suffered more severely than others in the catastrophe. The great demand for labour and services of all kinds had improved the position of the labouring classes, while there was no indication that the shop-keeper class had suffered very severely. In June the Committee decided to make an issue of grants on a larger scale to middle class families. The minimum was fixed at Rs. 300 and the maximum at Rs. 1,000.

Owing to the larger amount given in each grant, it was necessary to adopt a different procedure and to fix a sum available for each district, instructing the District Magistrates to use this for meeting the needs of the more urgent cases. The intention was to deal with a limited number of cases adequately, rather than

to give an inadequate sum to a larger number of applications. The allotments made to the different districts were as follows:—

	Rs.
Muzaffarpur	3,00,000
Darbhanga	1,00,000
Monghyr	1,00,000
Patna	75,000
Saran	50,000
Champaran	50,000
Bhagalpur	50,000
Shahabad	10,000
Purnea	5,000

It was found that some of the District Magistrates showed a strong tendency to treat the minimum laid down by the Committee as the maximum and the majority of these grants sanctioned were for a sum not greatly exceeding Rs. 300 each. In November the Committee decided to allot to middle class grants the balance of the Fund which was still unspent and the following additional grants were made to the five districts in which the needs were greatest :—

	Rs.
Muzaffarpur	2,00,000
Darbhanga	1,85,000
Monghyr	2,00,000
Champaran	75,000
Saran	40,000

The District Magistrates were instructed to make their grants on more generous lines and not to limit them to Rs. 300 each. By the end of December the grants sanctioned amounted to Rs. 6,53,803, made to 2,018 recipients.

It was not possible to ensure that the smaller grants were actually devoted to house-building, though there is no reason to believe that in most cases the money was misspent. The middle class grants were given in instalments. As the amounts were considerable, it was more necessary to ensure that recipients devoted them wholly to the repair of their houses. Further instalments were refused unless the recipient could show that he had spent the

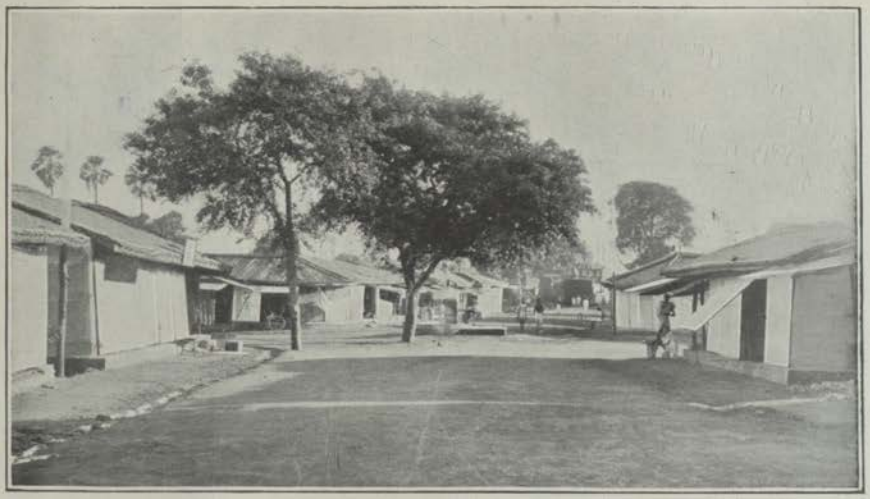
first instalment for its proper purpose. The same system was followed in disbursing the loans under the Natural Calamities Loans Act.

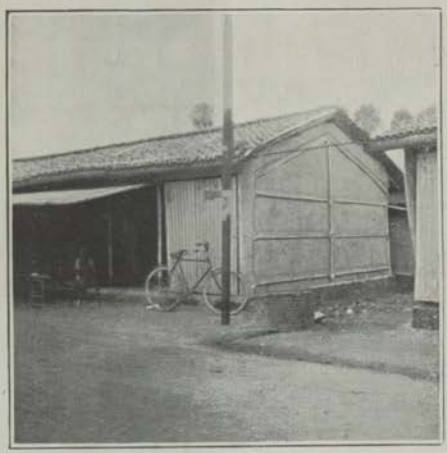
73. A number of cases came before the Committee in which persons of higher social status were in need of free grants. These were chiefly persons whose social status required that they should occupy houses of some pretensions but who had become financially embarrassed. To such persons a number of grants in excess of Rs. 1,000 were given. These grants were cut down to a scale which would enable the recipients to obtain a reasonable amount of shelter. **Larger grants.**

74. There were some cases in which aid was given partly for the re-building of houses and partly for other purposes. The landowners, particularly in Tirhut, had not only suffered the loss of their residential houses, but were faced with the problem of re-building their collection offices and other estate buildings. At the same time their tenants showed a general disinclination to pay rent and the usual sources of financial accommodation dried up. The planters were in much the same kind of difficulty, and their close connection with the sugar industry made it important to assist them. These difficulties were met by two measures. In March, Government announced that in certain areas of Tirhut payment of the land revenue and cess due on the 28th March would be accepted in genuine cases of hardship, without penalty, if paid on or before the 7th of June. It was announced that the landlords so benefited were expected to make a similar concession to their tenants. It was further arranged that landowners should be given loans under the Agriculturists' Loans Act to enable them to re-build their buildings, pay their land revenue and generally reorganize their business. A sum of Rs. 4,85,000 was advanced by Government under this head. The losses sustained by the planters of Tirhut were set forth in a memorandum which the Bihar Planters Association drew up. In almost all cases their bungalows had collapsed or had suffered very severe damage. Those of the planters whose financial position was good enough to enable them to take loans were offered loans on the same terms as the landlords. There were, however, a number of cases in which planters were in very serious financial difficulties. To this class the Committee of the Viceroy's Fund made grants of money totalling Rs. 1,27,500, so that they could re-build their houses and offices. **Assistance to landlords and planters.**

75. The scheme of distribution of grants from the Viceroy's Fund pre-supposed that, in the great majority of cases, the recipients required money to enable them to re-build houses. It was found **Non-house building grants.**

that there were a certain number of cases in which persons who did not own houses had suffered losses on a scale which entitled them to assistance. Legal practitioners and their employees had suffered owing to the cessation of cases, persons had been thrown out of employment owing to business losses arising out of the earthquake, while others had been subjected to severe expense of various kinds. To meet the needs of this class of sufferers, the Committee provided special grants, limited to Rs. 300 a head, which were designed to enable recipients to carry on till more normal conditions returned. In all, Rs. 2,02,271 was given to 1,907 recipients. Many applications were received for compensation for the loss of movable property. The impossibility of testing applications of this kind led the Committee to refuse to make such grants, except in cases where an applicant had been reduced to financial straits in replacing his property.





Semi-permanent bazar at Monghyr.

CHAPTER XVII.

The construction of semi-permanent houses.

Decision to build semi-permanent houses.

76. Though money was distributed on a very extensive scale to finance re-building, the inevitable delay in making a just distribution of so large a sum, and the danger of premature building on insecure soil, made it inevitable that considerable numbers would not find satisfactory shelter during the rains. The problem was almost entirely an urban one, since the rural population, owing to the simplicity of their houses and the ease of procuring materials, were able to execute more or less permanent repairs comparatively quickly. They had plenty of leisure for the task after the harvesting of the spring crops.

In those towns where the destruction of houses was very extensive, the inhabitants either patched up one or two rooms in their houses, or, if this was impossible, built grass huts on the ruins or in the immediate vicinity. Numerous huts of this type were built by various relief societies. These grass huts were usually of flimsy construction. They often caught fire and they were not adapted to stand prolonged spells of wet weather. With a large part of the population of certain towns housed in this manner, it became necessary to provide something better in view of the approach of the monsoon. It was decided to construct colonies of weather-proof houses of a cheap type, designed to last for about two years, since it was by no means certain that sufficient permanent houses would be reconstructed by the rains of 1935. The Mayor of Calcutta took the lead in constructing colonies and from his fund made allotments to the Collectors, out of which they built colonies, styled the "Mayor's colonies", at Darbhanga, Muzaffarpur, Motihari and elsewhere. Mr. David Ezechiel of Calcutta built an excellent colony at Muzaffarpur and others were provided by the Marwari Relief Society, the Ramkrishna Mission and the Servants of India Society. There were several reasons for the decision to build colonies, rather than isolated huts. The existence of a large number of isolated huts built among the ruins of the town was a severe tax on the conservancy arrangements. It was cheaper to build in one place, and the presence of numerous inhabitants squatting on the ruins impeded the clearing of the debris.

The Committee of the Viceroy's Fund decided to finance the building of semi-permanent colonies on a scale sufficient to provide for those persons who could not obtain accommodation in their own houses or in one of the private colonies. It was not until the end

of March that a final decision could be reached regarding the places where colonies were needed, the type of house to be built and the number of quarters necessary. By this time, a bare three months remained in which to build them. Colonies of appreciable size were constructed at Motihari, Muzaffarpur, Darbhanga and Monghyr. At Motihari, where the damage consisted more of subsidence than of the actual collapse of buildings, a comparatively small number was found to be sufficient. 52 quarters were constructed at the expense of the Viceroy's Fund and the Bettiah Estate, Mayor's Fund and relief societies constructed a further 155. These colonies were fully occupied.

Monghyr colonies.

77. At Monghyr, where a whole section of the centre of the town was completely uninhabitable, the construction of colonies began almost immediately after the earthquake. These were of various types, ranging from tin-roofed shelters with gunny walls to well-built houses of a substantial character. Over 3,000 were built. The main colony was that constructed at Bekapur, alongside the Chauk Bazar, to accommodate the shop-keepers who formerly lived in the latter locality. These shop-keepers were squatting in a most insanitary collection of hovels on the Ramlila maidan. The houses were sited in conformity with the Town Improvement scheme, which it had been decided to adopt. The debris from the clearance operations was used to raise low ground and to construct roads. New wide roads were laid out and attractive quarters were built along them. Some of the houses were shops, and others were shops with residential quarters to the rear. Electric light was installed so as to lessen the risk of fire. A good water-supply was furnished, and the colony soon became a prosperous and busy shop centre. The demand for the allotment of quarters in it was so brisk that another hundred quarters had to be built in the rains.

Darbhanga.

78. At Darbhanga, through the initiative of the District Officer, Mr. T. A. Freston, a bazar colony, laid out on model lines, was constructed at Lakshmisagar near the Darbhanga Railway station. Its original purpose was to accommodate shop-keepers from the Katki and Bari bazars, a very congested area where damage had been extreme. It went through various vicissitudes. Though the colony had many advantages, it became involved in the agitation against the Improvement Trust and it was found that the shop-keepers, as a whole, were unwilling to move so far from the old bazar. A large part of the colony was subsequently turned into living quarters, and was well patronized. Further colonies were built at Laheriasarai, and at other places in the municipality and found plenty of occupants.

A bazar street filled with debris.

Cobblers at work in Katki Bazar, Darbhanga, soon after the earthquake. They slept in the wrecked houses.

79. At Muzaffarpur there was more delay than elsewhere in making the preliminary enquiries. The Collector had a survey made by a committee which he had constituted to deal with the housing problem. This body reported that it had made a house-to-house survey of the municipality and had ascertained that it was necessary to construct 1,900 quarters in addition to 555 provided by private donors. These figures were accepted and arrangements were made to construct the quarters. It was possible to find sites for 382 of the quarters on small pieces of open ground within the town itself. These sites proved popular and the houses on them were well filled. But the majority, 1,763, were built in a compact block on a piece of open ground at Damu Chak about half a mile from the town. The event proved that the requirements of Muzaffarpur had been greatly overestimated. Though the last batch of houses was not completed, not more than a quarter of the Damu Chak houses found regular occupants. The vacant quarters were, however, of great value for accommodating the flood refugees who poured into Muzaffarpur from the villages during the July floods. The greater portion of the colony was dismantled in the cold weather of 1934-35 and the materials sold to persons who required them for the reconstruction of their houses. Muzaffarpur.

80. The problem of providing semi-permanent housing had to be faced at very short notice and with no previous experience on which to rely. Among the lessons which were learnt was that bazars could not readily be transported to new localities except when the old bazar was completely uninhabitable. It was evident that the population was able to accommodate itself in patched-up portions of the ruins to an extent far greater than had been supposed. There was a strong tendency on the part of householders to live in hovels where they could watch the building materials which they had saved, rather than to move to more sanitary quarters a short distance away.

The most common type of quarter was built with a corrugated iron roof covered with grass or tiles, with walls of bamboo covered with clay. This, except for the roof, was really an adaptation of a style of construction common in the villages of North Bihar, but designed on more commodious lines. The better class of quarter had two rooms, with a court-yard, privies and verandahs. The walls were liable to be damaged by the rains, but it was found at Monghyr that by mixing a small proportion of cement with the clay a fairly weather-proof wall could be obtained. In Darbhanga the usual type was in the form of long sheds with corrugated iron roofs. The end walls were of brick and the partition walls partly of brick and

partly of matting. At the smaller centres and at Motihari local materials were available, but for the larger colonies elaborate arrangements were necessary to obtain adequate supplies of corrugated iron, ballas, and bamboos. The total cost of the colonies which were built by the Viceroy's Fund was about eleven lakhs of rupees.

CHAPTER XVIII.

Town-planning operations.

Proposals for sweeping changes.

81. The wholesale destruction of buildings in areas which had been notorious for their crowded and insanitary condition, led some to advocate the view that a clean sweep should be made and the towns built anew on modern lines. The view was expressed that private owners should be compelled to re-build houses fit to stand the shock of another earthquake. It was suggested that the reconstruction of Tokyo after the earthquake of 1923 was a suitable model to follow.

The advocates of these proposals seldom indicated how they should be financed. The vast majority of the houses were private property. The existing municipal building regulations, not always strictly observed, prescribed a certain standard of construction and design. A drastic revision of these regulations would have had small justification. Even if it had been possible to legislate for improvements in the standard of construction, the scanty financial resources of the owners would have made it impossible for them to build themselves houses of a better type. People lived in ill-constructed bazar houses, not because they preferred that type, but because they could not afford anything better.

It was made possible for owners to obtain the advice of the Town Engineers and to learn from them how they could build houses based on better engineering ideas and with stronger materials. Pamphlets were published by the Relief Engineer describing the commoner defects of existing forms of construction, with advice how they could be avoided. The municipalities were directed to utilize the Town Engineers in passing plans for reconstruction, so that the building regulations were likely to be applied more strictly than had been the case in the past. There is now a marked tendency in North Bihar for people of the better classes to reconstruct their houses on simpler lines and to avoid double-storied buildings.

The actual problem.

82. It has already been explained that the small loss of life was due largely to the fact that it was possible to evacuate the houses before they fell. But, in certain congested localities, the roads and lanes were so narrow that the crowds of people escaping from the houses could not reach a place of safety. The mouth of the lane was often blocked by a hill of bricks. Great crowds were thus

jammed in the lanes between high buildings and became the helpless target of masses of falling masonry. In Monghyr Chauk, the places in which the rescue parties found the bodies indicated that it was often more dangerous to run into the lanes than to remain in the collapsing houses. Viewed as a practical problem, the improvement of living conditions in the towns resolved itself into devising means for widening the roads in certain congested localities. It was not feasible to ensure that people should have houses which should not fall down in the next earthquake; it was possible in the worst areas to see that the roads should be made wide enough to form reasonable places of refuge.

Monghyr town-planning operations.

83. In Monghyr town, the central bazar, the Chauk, was a densely congested area, covering about 15 acres. The two principal roads were between 20 and 25 feet wide. The side roads were 10 to 12 feet wide and often narrowed at their exits. The central part of the bazar was a tangled labyrinth of narrow lanes, winding among high houses. In one place there was a block, 150 feet long and 15 feet wide, which was occupied by 33 separate holdings. The only access to it consisted of two narrow lanes with an average width of seven feet. The whole of the Chauk, containing at the time three to four thousand people, collapsed so completely that it was transformed into a gigantic rubble heap, piled 15 feet high and extending over 15 acres. It was not possible even to tell where the roads had been. The authorities at first doubted whether it was possible to clear the area at all. Ultimately, after six months of continuous work, the debris was removed. Government is the ground landlord of this area and, under a clause in the leases which permitted this, the whole area was resumed. It was then laid out with 40 foot roads and the sites were again settled with the original tenants, care being taken to give each tenant a site corresponding as near as possible to his old holding. Though 85 per cent of the old tenants were re-alloted holdings in the Chauk, the area, as replanned, could only hold half the original population. The density of the population had been over sixty families to the acre. It was therefore necessary to find new sites for about 350 families. Fortunately, waste and arable land was available on the outskirts of the area. 27 acres of this land was acquired, and laid out with 40 foot roads. The building sites in the acquired area are being allotted to tenants from the Chauk who could not be replaced on their old holdings and to persons who held sub-leases in the Chauk. The whole scheme is estimated to cost Rs. 1,15,000, a large part of which will be recovered by the sale of land. Road-making was cheap, because debris from the Chauk was used to level and raise

The main street

A side lane

Katki Bazar, Darbhanga

the acquired area. It is significant that in several cases, where the new wide roads debouched on to narrow lanes outside the acquired area, the owners voluntarily came forward and gave up the land to enable the road to be extended.

The scheme was backed by the more responsible inhabitants of the town, including the majority of the house-owners who stood to lose heavily by the abolition of the old congested conditions and of the high rents which they involved. A section of malcontents conducted a campaign against the scheme in Monghyr and in the Press throughout the summer of 1934. The *bona fides* of Government and of the local officers was impugned, and misrepresentations were common. It was not until the actual reallotment of sites was made known, and an attack on the scheme in the Legislative Council was heavily defeated, that criticism died away.

84. The Monghyr conditions of congestion were reproduced on a smaller scale in Darbhanga town, where great loss of life occurred in the Katki and Bari bazars. These bazars were traversed by roads barely 12 feet wide, with high houses on them and extremely narrow service lanes. It was evident that the reconstruction of these bazars on their old lines could not be tolerated, but it was difficult to see how the improvements could be financed from public funds. None of the special factors were present which made the solution of the Monghyr problem relatively cheap. Soon after the earthquake, Maharajadhiraja Sir Kameshwar Singh of Darbhanga offered to advance Rs. 25 lakhs to finance an Improvement Trust for the improvement of the town. This generous offer was the signal for a great deal of local criticism. It was even suggested that the offer was inspired by motives of personal aggrandizement. The possibility of working an Improvement Trust in the town was examined by Government. It was found that the expenses must inevitably exceed the income, so that an Improvement Trust working on borrowed capital would not be solvent. To meet this difficulty, the Maharajadhiraja revised his offer and undertook to make a grant of Rs. 5 lakhs, and to lend up to Rs. 9 lakhs, to the Improvement Trust, when formed. It was ascertained that, on these terms, it was feasible to undertake a scheme for widening the roads in the bazars and for providing sites for the dispossessed inhabitants on more open land contiguous to them. An Improvement Bill was prepared, and was passed by the Legislative Council in September 1934. The Trust was formed in November and is now preparing an improvement scheme. As the municipal map of Darbhanga was too old to be of use in this scheme, the local Government had an aerial survey made of the town—the first

Darbhanga.

occasion on which a town in Bihar and Orissa was surveyed by this method.

Muzaffarpur. 85. In Muzaffarpur, though the roads in the greater part of the town are reasonably wide, there are a number of lanes in the older portions which are dangerously narrow. Most of the casualties occurred in this part of the town. Proposals are being prepared for widening these lanes, and a sum of Rs. 2 lakhs from provincial revenues was voted for the purpose in September. A complete re-designing of these roads would be prohibitive in cost, and the scheme aims at acquiring only the cheaper houses. By this means, though continuous wide roads cannot be created, sufficient space can be obtained to form refuges if another earthquake occurs.

An interesting example of road-widening occurred at Madhubani and Jainagar in Darbhanga district. The bazar roads in these places were extremely narrow and a very large number of the houses collapsed. The Subdivisional Officer, Mr. Archer, while the impression caused by the earthquake was still strong, persuaded the owners to give up strips of their frontage for road-widening. He acted at once and supervised personally the marking of the new lines and the demolition of structures which fell within them. The operations were remarkably successful and the inhabitants, almost without exception, re-built their houses on the new frontages without any compensation.

CHAPTER XIX.

The organization of supplies.

86. The provision of supplies of building materials was a problem which caused great anxiety. The potential demand was on a scale altogether unprecedented. It was almost impossible to forecast the rate at which this demand would materialize, but it was certain that, unless special measures were taken, profiteering in building materials would occur and the reconstruction of houses would be slow and far more costly than it need have been.

Arrangements in South Bihar.

In the matter of supplies, there was a marked difference between Tirhut and the rest of the affected area. In South Bihar, the towns of Patna, Monghyr and Bhagalpur, where most of the damage was done, enjoyed excellent railway communications and the import of materials was unimpeded. The normal supply arrangements of these districts are good; they are capable of expansion and the areas are sufficiently in touch with other parts of India for the demand to attract suppliers from outside. Re-building in these districts began very soon after the earthquake. Generally speaking, there was no marked tendency for prices to rise. At Patna and Bhagalpur no special arrangements were made after the initial stage, and there has been no indication either of shortage of supplies or of unusual increases in price. At Monghyr special facilities were given to suppliers to start new agencies and both the local contractors and outsiders were encouraged to manufacture an adequate number of bricks. These measures were adequate. Though in July and August, the information collected by the Town Engineer showed that 30 million bricks were being arranged for, at the end of December kilns were in operation which, if worked to the full, will turn out 100 million bricks by the end of the season.

Special difficulties in North Bihar.

87. Tirhut, on the other hand, is an area with poor external communications. To the east and west, a single line of metre gauge railway connects it with the outside world. All railway traffic to the south has to cross the Ganges, and the sole link for traffic of any bulk is the wagon ferry and transhipment station at Mokameh Ghat. Throughout the sugarcane season, from December to May, there is liable to be a shortage of rolling stock for ordinary traffic, conditions which were accentuated, in the months after the earthquake, by the damage to the line. All coal for brick-burning,

all structural steel and much of the cement and lime, have to pass through the bottle neck of Mokameh Ghat. For long periods, transport arrangements are such as to cause shortage of supplies and to provide an incentive to local profiteering. Had the demand for building materials materialized in Tirhut as quickly as it did in South Bihar, the supply would almost certainly have fallen far short of requirements. As it happened, the situation was eased by the general disinclination to build until the monsoon had tested the stability of the soil.

Relief materials.

88. For some months after the earthquake, the principal demand was for materials for the immediate repair of houses, and for the construction of temporary shelters. At various centres the District Officers laid in stocks of corrugated iron, ballas, poles, thatching grass and the like, and sold them at concession rates to earthquake sufferers. Similar enterprises were undertaken by the various relief societies. At this stage it was thought advisable to cheapen the cost of such material. The railways allowed generous freight concessions. Consignments of relief materials were transported at half tariff rates on parcels and goods. For sal ballas and scantlings, bamboos, rope and thatching grass, the broad gauge railways charged one-tenth of a pie per maund per mile, and the metre gauge railways 1¼ annas per mile per wagon. These rates were available for consignments made to certain officers of Government and to some of the private relief societies. With the help of these concessions it was possible to draw on a large area and to import large quantities of material. Several hundred tons of corrugated iron were obtained from the Tata Iron and Steel Company. This company sent a supply of rejected sheets to Monghyr free, and for a time supplied sheets at a special price. The Government of the United Provinces furnished 51,000 sal poles at the bare cost of extraction. These poles were despatched to Muzaffarpur, Darbhanga and Chapra, and without them it would have been impossible to erect the colonies in time. The Ruling Chief of Mayurbhanj sent large consignments of timber to Monghyr, free of cost. Supplies of bamboos were drawn from the Government forests in Palamau and timber from North Bengal. In the difficult traffic conditions which prevailed in the early summer of 1934, the transport of these materials caused constant anxiety, but all supplies were got through before the rains broke.

General policy.

89. The special freight concessions lapsed on the 30th of June 1934. For some time previously, there had been complaints from regular traders that the relief societies were interfering with the normal marketing arrangements by importing building materials

at concession rates and selling them in the open market. Though some of the relief societies protested against the reimposition of ordinary tariff rates of freight, there is no doubt that the decision was right. The situation was changing, and with the commencement of the era of permanent reconstruction it became more important to stimulate the regular trade in building materials than to aim at providing such materials at very low prices. Any attempt to create an *ad hoc* organization for supplies, underselling the regular trade agencies, was doomed to failure and would have stifled the private enterprise which it was essential to encourage. The policy which the local Government adopted was to obtain as full a knowledge of the probable demand as was possible, to encourage the local sources of supply to meet this demand and to encourage the entry of outside agencies to the extent necessary to supplement local sources, where these appeared to be inadequate or to be unwilling to expand supplies. The object was to maintain, not an artificially low range of prices, but steadiness of prices at a level which was reasonable from the point of view of the consumers and would at the same time encourage the development of private enterprise. Where an individual required help, it was to be given in the form of a money grant, not in the form of lower prices.

Coal for brick burning.

90. During the summer of 1934, careful investigations were made by the Supply Officer into the probable demand and the extent to which it could be met. It was found that the principal difficulty was to secure adequate supplies of brick in North Bihar. At the end of the brick-burning season before the new supply was ready, the price at Muzaffarpur rose by 80 or 90 per cent. In some places the local brick-burners did not appear to be making arrangements to burn bricks on a scale at all adequate to meet the probable demand. In particular, in spite of warnings that wagon facilities for coal would be restricted as soon as the cane season started, there was no noticeable attempt to lay in coal for brick-burning during the rains, when transport is available. Everything thus pointed to a serious shortage of coal in the brick-burning season, which lasts from November to June. This situation was met by the purchase of 50,000 tons of brick-burning coal in August. This was transported to North Bihar in the three following months. Though the capacity of Mokameh Ghat for non-railway coal was only 685 tons a day, the whole supply was transported in time without dislocating the ordinary traffic. The coal was stored in fifteen dumps adjacent to the principal brick-fields. Arrangements were made to sell the coal to burners under an agreement which provided that the bricks should be sold to the public at a fixed rate. As the coal had to be

stored for long periods a low volatile coal was purchased. The local burners were not used to it, and there was initially some prejudice against it. But by the end of December, Mokameh Ghat began to be blocked, the coal was tried and found satisfactory, and a good demand for it arose.

Guarantee system.

91. The number of kilns for which preparations were being made still appeared to be inadequate. There was reason to believe that at some centres the brick-burners were adopting far too conservative a view of the probable demand, and were unwilling to risk their money in burning a large quantity of bricks. A vicious circle was likely to be created : private persons would not commit themselves to building unless they were certain that prices would be reasonable, while burners were only prepared to burn for an assured demand. Government therefore offered to guarantee brick-burners against losses which might occur if they overestimated the demand. The amount which each brick-burner might reasonably be expected to burn at his own risk was estimated. This amount he was to burn and sell at his own risk. Government guaranteed that, if he burnt a specified additional quantity, they would purchase at a fixed price any portion of this additional quantity which he was unable to sell by the end of the season. Under this system, Government gave guarantees for the purchase of 72 million bricks at the different centres in Tirhut.

Cement and Lime.

92. It was found that the existing sales organization for lime and cement was adequate to supply the probable demand. A good deal of research was conducted into the possibility of improving the quality of the lime which was offered for sale. There was reason to suppose that the use of inferior lime was responsible for much of the damage which buildings suffered in the earthquake. The Cement Marketing Company of India made very important reductions in the price of cement in the earthquake area, varying from a 20 per cent reduction in Monghyr and 12½ per cent in Muzaffarpur to smaller reductions elsewhere. There was some difficulty in devising arrangements which would prevent cement from being re-exported for sale outside the earthquake area, but the isolated position of Tirhut rendered a zoning system possible, while at Monghyr purchasers were obliged to obtain the certificate of the Town Engineer before they could obtain the full benefit of the rebate.

Steel.

93. The Tata Iron and Steel Company granted a rebate of Rs. 8 a ton on untested steel. This was limited to a total amount of 4,000 tons and was worked through a system of certificates granted by the Collectors or Town Engineers. These certificates were

Muzaffarpur Jail, with British infantry on guard.

accepted by the dealers in part payment, and subsequently recouped by payments from the Steel Company through the Supply Officer. The offer, as originally made, expired on the 31st of October 1934. Very few applications were made in this period, partly because it did not coincide with the building season, and the Steel Company generously extended their offer until the 31st of March 1935.

Arrangements were also made with the firm of Bhanamal Gulzarimal of Patna to open depots for the sale of untested steel at a controlled rate of profit. Sites for their depots were given free by Government, a concession which was also given to retailers of other building materials who agreed to sell at controlled prices. For supplies of timber, bamboos and roofing tiles, the enquiries indicated that the local agencies would probably be able to meet the demand and no special arrangements were made. Very large quantities of these materials were salved from the wreckage and were capable of being used again.

At the time of writing the supply arrangements had not been fully tested, since building operations in Tirhut had not commenced on a very extensive scale. At the end of December the situation was developing in the manner which was expected. The adequacy of the measures will be known more fully as the season advances.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

CHAPTER XX.

Charitable funds and the work of relief societies.

The Viceroy's Fund.

94. The appeals to the public resulted in the collection of about a crore of rupees in the major funds which was subscribed for the relief of sufferers. When the numerous contributions in kind, and collections by various relief societies are reckoned, the total must be considerably over a crore. The generous response of the public in India and elsewhere provided resources which were of inestimable value in alleviating the suffering. They made possible a distribution of help on a very large scale.

On the 19th of January, His Excellency the Viceroy issued his appeal for subscriptions to the Viceroy's Earthquake Relief Fund. The Lord Mayor of London opened a fund in England, which was paid into the Viceroy's Fund. When the fund was closed on the 1st of October 1934, a total of Rs. 60,16,041 had been subscribed. A noticeable feature of this fund was the large proportion of it which came from small subscribers. The sufferings of the people of Bihar touched the hearts of a very wide circle. His Excellency the Viceroy took a close personal interest in the fund. His Excellency came to Patna in March. He visited Muzaffarpur and inspected the damage both in town and country.

A Central Committee at New Delhi administered the fund. This Committee decided major questions of policy. The expenditure of the fund was directed by the local Committee at Patna which has been mentioned in Chapter IV. The work of Secretary was performed by Mr. H. C. Prior, Finance Secretary to the local Government, and that of Treasurer by Major Donovan Jackson, Agent of the Imperial Bank of India at Patna. The management of so large a fund was an extremely onerous task.

At a very early stage, in response to an enquiry on the subject, His Excellency Sir James Sifton gave the assurance that the whole disbursement of the fund would remain in the hands of officers of Government—an undertaking which was scrupulously honoured. The expenditure was subjected to detailed audit by the Accountant-General. Mr. I. B. Sen Gupta, an Assistant Accounts Officer, was specially appointed to superintend the keeping of the accounts in the districts. He toured extensively and as a result of his work, the District Officers were able to keep the accounts from the beginning in a form which facilitated efficient audit. An audited

balance sheet of the fund up to the 31st July 1934 was published in September. The balance sheet as on the 31st of October was published in January 1935. Apart from these accounts, the public were kept informed, by means of press communiques, of the objects on which the fund was being spent and the progress of expenditure. The nature of the expenditure is explained in various portions of this report, and need not be described here in detail. A balance sheet up to the 31st October 1934 is printed as an appendix. More than half the fund has been spent on grants to help private owners to effect permanent reconstruction of their houses. One-sixth was spent on semi-permanent housing to shelter the population during the rains, and the balance on charitable relief, the provision of supplies and other items. The cost of administration was only Rs. 3,507. Most of the work of administration was done by Government servants, whose salaries were not debited to the fund.

In November 1934, when the fund was nearly spent, the Committee reviewed the position and decided to allot Rs. 7 lakhs more for house-building grants to the middle classes. This allotment, which is expected to be spent gradually during the cold weather, is calculated to exhaust the assets of the fund, except for a small sum of two or three lakhs of rupees.

As statements have been made to the effect that a portion of the Viceroy's Fund was utilized for the repair of roads, it is necessary to state that in no case was expenditure on such objects debited to the fund.

95. In September the following letter was addressed to His Excellency the Governor for transmission to His Excellency the Viceroy. It was signed by all the leading men of Bihar :— **Gratitude of Bihar.**

" We, the signatories of this statement, have recently seen the announcement in the Press, that His Excellency the Viceroy's Relief Fund will be closed on October 1st. We shall be grateful to Your Excellency if you will kindly convey to His Excellency the Viceroy our sense of gratitude and appreciation for the great interest that His Excellency the Viceroy has taken in organizing the Relief Fund, which has enabled the stricken people of the province of Bihar to obtain relief from suffering in their unprecedented misery and distress.

" We feel that it was exceedingly kind of His Excellency Lord Willingdon to have taken up so promptly, earnestly and zealously the question of organizing a fund for the relief of the suffering humanity in Bihar, and in the neighbouring areas. We are certain

that, but for the great economic depression prevailing at present all over the world, the amount raised would have been appreciably larger. But we think it desirable to place on record that the large amount of Rs. 60 lakhs, which has been collected in response to His Excellency Lord Willingdon's appeal, is none the less a substantial amount for which the people of Bihar owe an endless debt of gratitude to His Excellency the Viceroy for raising it, and to numerous generous and large-hearted donors for contributing to His Excellency the Viceroy's Relief Fund.

" We also feel that but for His Excellency the Viceroy's strenuous endeavours, the amount collected would possibly not have been even so large as it is. It is for this reason that we have felt justified in approaching Your Excellency, as the head of the Government of Bihar and Orissa, to be good enough to transmit to His Excellency the Viceroy this message of gratitude and appreciation for the good work which he has done for the people of Bihar at the present juncture."

The Bihar Central Relief Committee.

96. The most important of the charitable funds, after the Viceroy's Earthquake Relief Fund, is that raised in response to the appeal launched by Babu Rajendra Prasad, the leader of the Congress party in Bihar. A separate organization, styled the Bihar Central Relief Committee, was created to administer and expend this fund, and was registered as a charitable society. The subscriptions up to the middle of November 1934 amounted to Rs. 28,39,565 in cash and Rs. 3,30,587 in kind. This fund has not been closed.

At the outset, Babu Rajendra Prasad announced that the fund would be expended in co-operation with Government. The Bihar Central Relief Committee took a full share in the distribution of food, clothing and blankets immediately after the earthquake. They sent out a number of workers, and organized numerous centres, which were staffed chiefly by those who had been prominent in the civil disobedience campaign. Their activities took the form of rescue work, the provision of medical aid, the clearing of debris, the building of temporary grass huts and the numerous other forms of help which became necessary immediately after the earthquake.

In February, when the need for immediate charitable relief had lessened, it became necessary to decide how the large sums at the disposal of the Committee could best be utilized in the work of reconstruction. Babu Rajendra Prasad addressed a long letter to Government on the subject. In reply Government gave him a full description of the problems. They indicated the measures which they proposed to take, and the manner in which the funds of the

Committee could best be expended so as to supplement those measures.

In the third week of March, the Committee met to decide their policy, with Mr. Gandhi in the chair. The intention to co-operate with Government was reiterated in a formal resolution, and, in response to an invitation, the Relief Commissioner met the Committee and discussed the situation with them. The programme, as ultimately adopted, provided for expenditure on the clearing of wells and tanks, sinking new wells, draining water-logged areas, relief to the indigent, medical aid and sanitation, provision against flood and famine and other general relief. It appeared to the Committee that house-building, of a permanent or semi-permanent nature, and the removal of sand were beyond their ability to cope with. They decided not to take up this form of work, pending Government action, but to make a detailed investigation into the needs of townsmen and make recommendations to Government on the basis of this investigation. At this period, the Committee was evidently of the opinion that famine conditions would be established in North Bihar, and that large sums would be needed for charitable relief. This expectation fortunately did not materialize.

Expenditure of the fund.

97. Throughout the summer, Babu Rajendra Prasad and the Relief Commissioner frequently met and discussed problems arising out of the work of reconstruction. The Committee proceeded to carry out their programme. An extensive programme of well-sinking and repair of wells was carried out. The Committee supplied boats to supplement those built by Government and the district boards and co-operated in the working of the flood rescue organization. Another of their activities was the organization of shops at which supplies could be obtained below the market-rates. At the instance of the Committee, Dr. Pierre Ceresole of the International Service League came to Bihar. In the cold weather of 1934-35 he returned and helped to organize the work of transferring to new sites villages which had become water-logged by the floods.

The accounts up to the 30th September 1934, which were published in an audited form in December, showed that there were balances amounting to Rs. 14,03,000, and advances totalling Rs. 1,37,000. Offices and equipment, stock, cycles and cars had absorbed Rs. 1,28,000 and administrative expenses, Rs. 34,000. The balance, representing expenditure on actual relief to the public, was Rs. 12,60,000. The principal items were Rs. 4,77,000 spent on water-supply, Rs. 2,15,000 on temporary huts, Rs. 1,32,000 on flood relief and Rs. 1,03,000 on middle class relief.

In August and September, widespread distress was caused by floods in the Ganges and the Son. Though the areas affected coincided to some extent with the areas which had suffered in the earthquake, these floods had no connection with the earthquake. The Bihar Central Relief Committee expended considerable sums on operations connected with them.

At the end of the year, a large portion of the subscriptions apparently remained unexpended. Though at a later stage, it was decided to spend money on middle class building grants, it is possible that the initial abstention of the Bihar Central Relief Committee from expenditure on housing grants may make it difficult to spend the balance of the fund. The experience gained from the administration of the Viceroy's Fund suggests that the sums which could usefully be expended for objects other than grants for house-building are limited. At the same time, the practical difficulties of making a just distribution of such grants among a host of competing claimants are so great that it is doubtful whether any private organization could overcome them. A relief society which is largely identified with a particular political party encounters these difficulties in an accentuated form.

The Mayor of Calcutta's fund.

98. Mr. Santosh Kumar Basu, Mayor of Calcutta, opened a special fund, to which many of the Calcutta subscriptions were paid. The fund reached a total of Rs. 4¾ lakhs. The Mayor came to Bihar. He visited some of the devastated towns and consulted the local Government on the most suitable method of spending the money. Rs. 94,000 was spent on the erection of semi-permanent huts. The number and design of the huts was settled and the money was then made over to the District Magistrates, who had the huts built. The allotment of Rs. 50,000 for the sinking of tube-wells has already been mentioned. Sums amounting to Rs. 1,15,000 were placed at the disposal of His Excellency the Governor for expenditure on relief. About Rs. 1½ lakhs was made over to the various relief societies which maintained organizations in the earthquake area. The fund was closed on May 31st, 1934, after accomplishing a very useful and business-like programme.

Other relief organizations.

99. A large number of relief organizations collected funds of their own, and organized centres where charitable activities were conducted. Some of these were bodies with a long record of humanitarian work: others were organized for the occasion or consisted of bands of independent workers. There was a great influx of workers from various parts of India. The principal relief organizations, which have not already been mentioned, were the Indian Red Cross Society, the Indian Medical Association, the Servants of

India Society, the Ramkrishna Mission, the Memon Relief Society, the Kalyan Brata Sangha, the Marwari Earthquake Relief Association and the Distressed Cattle Committee.

The first two associations were concerned chiefly with immediate relief, and withdrew when the need for it had passed. The Kalyan Brata Sangha devoted itself chiefly to the needs of the domiciled Bengali community. The Memon Relief Society adopted the very practical work of re-building the houses of poor persons. The Servants of India Society and the Ramkrishna Mission are both bodies with a long experience of humanitarian work. They and the Marwari Relief Society accomplished a great deal of extremely useful work both in the immediate crisis and during the period of reconstruction. The Distressed Cattle Committee took up the work of providing fodder, which tended to run short at various periods in North Bihar.

The bodies named above are only the most prominent of the numerous organizations which came and worked in Bihar. Space does not permit a description of the individual operations of all these organizations of relief workers. Numerous offers of help were received from individuals, and many persons came and worked at the relief of suffering. The readiness with which they rendered both personal service, and help in money and kind, will long be remembered with gratitude by the people of Bihar.

CHAPTER XXI.

Relief operations in the large estates.

Darbhanga Raj.

100. The Darbhanga Raj suffered very great losses in the destruction of the numerous palaces and other large buildings which it owned both in Darbhanga district and elsewhere. Most of these were completely wrecked. The Raj took a prominent part in the various relief measures which were undertaken in Darbhanga immediately after the earthquake, in clearing the streets, making medical arrangements and rescuing the injured. It provided sites and materials for the erection of shelters to house the people. Each Circle Manager was given Rs. 1,000 for immediate gratuitous relief among the tenants. In addition to allowing the supply of free building materials to tenants, the Raj gave wood, bamboos and other materials to the value of Rs. 9,642 to the Bihar Central Relief Committee for distribution to the public. 105 wells were sunk, and 10 tanks were re-excavated. In certain villages, where the site of the houses was rendered uninhabitable, fresh sites have been provided.

An issue of loans was made to tenants at 2 per cent for the purpose of building houses and clearing sand. About 4 lakhs of rupees have been given out. About Rs. 40,000 has been lent for house-building purposes to persons who are not tenants of the Raj.

The Bettiah Estate.

101. The Bettiah Court of Wards Estate, which is under the management of a senior officer of the Indian Civil Service, took a very prominent part in the relief operations in the district of Champaran. The estate undertook the distribution of loans and free grants for sand clearance in a portion of the district and spent over 1½ lakhs of rupees for the purpose. Grants to the extent of Rs. 57,000 were made to persons having a special claim of the estate for reconstruction of their houses. Arrangements were also made to issue loans for house-building, but subsequently applicants were advised to take loans from Government, as the special protection afforded by the Natural Calamities Loans Act could not be given to a private estate. Probably the most valuable assistance given by the estate to its tenantry was the immediate gratuitous distribution of very large quantities of building materials, timber, grass, and bamboos. The value of these supplies was between one and two lakhs of rupees. A very valuable contribution which the estate made to the recovery of the district from the effect of the

earthquake was the employment of about 400,000 labourers on work on a relief nature. The great majority of these labourers were persons in urgent need of assistance. The estate constructed a colony of 54 semi-permanent houses at Motihari to accommodate persons of the middle classes and spent over half a lakh of rupees upon it. It also built temporary houses for the Collector and the Civil Surgeon of Motihari, who had formerly occupied houses leased from the estate. The buildings of the estate suffered severe damage, including the King Edward Memorial Hospital at Bettiah; a temporary structure containing 67 beds was completed before the end of March. The rapid construction of this and other temporary buildings reflects very great credit on the staff of the estate. The loss to the estate in buildings will probably be between 12 and 15 lakhs of rupees.

CHAPTER XXII.

Attitude of the public, the Press and the Legislative Council.

Government bulletins.

102. For the first few days after the earthquake authentic news of the disaster was difficult to obtain. There was some disposition to complain that the local Government did not supply more news : its own difficulties in obtaining news have been described.

The first official communiqué was published on the morning of the 17th and the second on the evening of the same day. Two more communiqués issued on the 18th, and a daily bulletin of news was published until the end of January. Thereafter bulletins were published at longer intervals : from the beginning of February to the end of July, 26 formal communiqués were published, in addition to a number of less formal items of news. As each of the various investigations, such as the sand survey, the survey of levels, etc., yielded definite results, the results were communicated to the public through the Press. A report on the progress of reconstruction work was published in June. It was translated into Hindi and Urdu and circulated widely. The vernacular edition was published by Rai Bahadur Ram Ranvijaya Singh, M.L.C., of Patna, at his own expense. In certain districts special publicity organizations were maintained to keep the public informed of the relief operations.

The newspapers.

103. The attitude of the local Press was friendly. The editors published *in extenso* all matters which they were requested to publish, and were nearly always ready to give prominence to corrections of published matter which proved to be inaccurate. In a leading Calcutta newspaper, there were certain instances in which official communiqués appeared in an inaccurate form, and statements were published as emanating from Government which came from other sources—incidents which led to some misunderstanding of the position. In April, the " Statesman " published a supplement on the earthquake. It contained articles on earthquake topics and reproduced a number of excellent photographs of the devastated areas. One of the difficulties of earthquake publicity was the fact that even those who are familiar with the country could not appreciate the full extent of the calamity through verbal descriptions. Photographs were invaluable in showing how complete the destruction had been.

The earthquake remained a prominent feature in the Press for four months. Descriptions by eye-witnesses were published on

an extensive scale, while the various relief societies issued statements in great detail describing their activities. Many of these articles tended to emphasize the darker side of the picture. Among newspapers published outside the province, particularly those which represented the more extreme school of politics, there was a disposition to misrepresent the measures taken by official agencies and to make political capital out of the situation—an attitude which was discountenanced by the Bihar newspapers. An officer was lent by the Home Department for a few weeks in the early summer for the purpose of presenting in the Press the official side of the relief operations.

The public.

104. The attitude of the leaders of public opinion in Bihar was one of full co-operation with Government and there was a very general recognition that the situation was being handled in an efficient manner. It is true that Pandit Jawahar Lal Nehru, after a flying visit to Bihar, published an article in which it was suggested that the Bihar Government had ceased to function for some days after the earthquake. This calumny found no response among the people of Bihar, who knew the real facts. There was a very general feeling that in the face of the unexampled catastrophe which had befallen Bihar, political controversies should be forgotten and all should unite in the work of restoration. This was no mere passing wave of sentiment. Throughout the operations, leading men of all shades of opinion co-operated freely and effectively with each other and with Government. There was an absence of carping criticism and a general disposition to help those who were known to be doing their utmost to cope with the situation. Nor was this attitude confined to the leaders of public opinion. At the conclusion of the sugarcane operations, the Director of Industries received many assurances from the cultivators of their gratitude for the work which Government had done for them. The undemonstrative masses showed a praiseworthy patience, and though they might clamour for relief, there was no indication that they disputed the justice of its distribution.

The Legislative Council.

105. The Legislative Council showed the same attitude. Bills to facilitate the issue of loans for house-building and to amend the Municipal Act to suit the new circumstances, were passed in the February session, and the Council readily agreed to curtail the budget discussions so as to leave more time for the work of relief and reconstruction. When the Council next met in September, Government were able to put before it a number of proposals, financial and legislative, closely connected with the operations. The Bill to constitute an Improvement Trust for Darbhanga was

passed with a minimum of friction. There was much discussion on the proposal to move the Government buildings at Motihari to a new site : the view of the local residents, that it was possible to re-build in Motihari itself, found many advocates. Ultimately the Council agreed to leave the decision on this point to His Excellency who was about to visit Motihari. The only other measure which was attacked seriously was the financial provision necessary to carry out the Monghyr town-planning scheme. The justice of this measure was severely criticized by one of the Monghyr members, but he found no support for his views and the money was voted by 40 votes to 14.

Throughout its proceedings, the Legislative Council showed its belief that the main lines of policy were right and that they were being carried out in a manner which deserved support.

APPENDIX I.

Extracts from the speech by the Hon'ble Finance Member of the Government of India in introducing the Budget proposals for 1934-35.

40. *Plan for dealing with Earthquake damage.*—This brings me to the last important item in our financial proposals for this year—our plan for helping to finance the measures rendered necessary by the recent earthquake. I have already mentioned one feature in this plan, namely that we propose to transfer our estimated surplus of 1,29 lakhs in the current year (or whatever the final amount of that surplus may be) to a special fund which will be utilised in assisting the Provinces, chiefly of course Bihar, which have suffered from the recent earthquake.

41. The problem of reconstruction with which the Government of Bihar and Orissa is confronted can conveniently be treated under four main heads.

(*a*) *Reconstruction of Provincial Government buildings, etc.*—There is first the reconstruction of Government property, chiefly buildings, though there has been some damage to canals. On such rough estimates as it has yet been possible to prepare the cost of repairing this damage may be put at about 1 crore. Our proposal is that the Government of India should, as capital expenditure on its own account, provide half the cost of reconstructing and repairing their damaged property, and should make a loan to the Provincial Government of the remaining half through the Provincial Loans Fund.

(*b*) *Financial help to local authorities.*—Secondly, there is the very extensive damage to the property of local bodies in Bihar, their roads and bridges, their schools, hospitals and dispensaries and so on, including the damage to what are known as aided schools, established through the benevolence of private individuals. A very rough estimate of the cost of repairing the damage is rather over one crore. The resources at the disposal of these local bodies are entirely inadequate to cope with a disaster of this magnitude. Such help as they may be able to render will necessarily be very restricted. It would not be possible to assist them by means of loans requiring payment, even if interest charges

were made very low or remitted altogether, without crippling their activities for the future. In short, as they have lost for the time being the main sources of their income, it will be necessary to place them in funds with which to carry out their normal responsibilities until their income has recovered. For all these purposes we propose to make a free grant from central resources that is to say, from the special fund already mentioned which is to be formed out of this year's surplus. It may not be possible to undertake and complete all the necessary rebuilding before the end of 1934-35 since it may not be until after the next monsoon that accurate knowledge will be available of the extent to which the drainage of the country has altered and foundations for buildings and bridges are secure. We are therefore providing in next year's estimates for expenditure of only 75 lakhs on this account, but I can assure the House that if it is found that more than this can be advantageously spent we shall have no hesitation in providing the additional sum required.

(*c*) *Assistance to private individuals.*—Thirdly, there is the question of assisting private individuals to rebuild their houses and shops. To many of the poorest sufferers from the earthquake their small dwellings and shops must have been their sole asset; they have no cash which they can use, or credit which they can pledge, for restoring them and it would be useless in most cases to proffer them assistance by means of loans on however favourable terms. It seems to us that this part of problem must primarily be dealt with by means of free grants and that these grants are eminently an object on which the Viceroy's and other Relief Funds should be expended so far as they are not needed for immediate relief. The field is a very wide one but I am confident that the public, both here and in Great Britain, will respond most generously now that they know the magnitude of the need.

There is, however, another very wide class who though they have not lost their all through the earthquake and would not be fit or even willing recipients of charity, are urgently in need of assistance to rebuild their house property, and to whom this assistance can most suitably be afforded by means of loans. We have been very actively discussing with the Government of Bihar and Orissa the plan for the grant of such loans and I had hoped to be in a position today to announce at any rate the main outlines of the scheme, but there are still some points to be settled. If it is in any way possible, I will give further information to the House at a later stage of our budget discussions. At the moment all I can say is that we have every intention of making available to the

Provincial Government on terms that will not be onerous to them, or to those who are ultimately to receive the advances, whatever sum may be found to be needed for this purpose. I will not at present venture to give an estimate of what that sum may be.

(*d*) *Agricultural problems.*—Fourthly, there is the agricultural problem. It is known that there has been damage to agricultural land over wide areas in the north of Bihar due to the deposit of sand. The extent and severity of this damage, what measures can be taken to rectify it, and what the cost of those measures will be, cannot be known until a fairly detailed survey of the affected area has been made, and at present the flooded condition of a great part of the area makes such a survey difficult, though the Provincial Government have already taken steps to initiate it. I cannot therefore at the moment say in exactly what form our assistance will be given. All I can say is that we consider that the balance held by the Provincial Government in their Famine Relief Fund can be properly regarded as available for this purpose, and beyond that we propose to assure the Provincial Government of our financial support in any further action that may subsequently be decided upon.

42. I have dealt so far with the problems of permanent reconstruction. The principal necessities for immediate relief have been and are being met energetically by the Provincial Government out of money which has been made available from the Viceroy's and other Relief funds; but there is one way in which we propose to contribute towards immediate relief from Central revenues. Seven of the sugar factories in North Bihar have been destroyed and two more have been very seriously damaged, with the result that cane-growers in this area have been deprived of a market for about 15 million maunds of cane. It is hoped to make arrangements for transferring the bulk of this cane with the necessary expedition to factories in the south of Bihar or the east of the United Provinces and the railways concerned are prepared to carry it at very low concessionary rates of freight. But some portion at any rate of the cane cannot be dealt with in this way, and the Provincial Government are therefore providing country mills and other equipment in order to convert it into *gur*. We have informed them that we are prepared to bear the whole cost of this measure from Central revenues; it will probably not exceed 5 lakhs.

43. I may sum up our proposals and their effect on our financial estimates as follows. We are undertaking to bear the whole cost of restoring the property and finances of the local bodies, which we

put for the present at something over a crore, and the whole cost of the special measures for dealing with the cane crop, which we put at about five lakhs. We propose to meet this expenditure from the special fund to which this year's surplus now estimated at 1,29 lakhs, will be transferred; and we expect to spend 75 lakhs from this fund up to the end of 1934-35. We are also undertaking to bear half the cost of restoring the Provincial Government's own buildings and other public works; this, on present estimates, we expect to cost us about fifty lakhs, which we mean to provide from funds raised on loan, and have allowed for in next year's ways and means estimates.

In addition we are undertaking the liability for the cost of any measures of assistance to agriculturists that may be decided upon to the extent that it cannot be met from the Provincial Government's Famine Relief Fund, and we are undertaking to advance whatever capital may be required for financing rebuilding advances to those persons whose position does not warrant assistance in the form of charitable grants, on terms which will lay no undue burden on the persons concerned or on the Provincial Government. I cannot as yet indicate what the final cost, if any, of these loan measures will be to Central revenues, or how we shall propose to meet it. For the present so far as the ways and means position is concerned, we are assuming in our estimates a capital outlay of two and three-quarter crores on loan measures and on the capital grant for restoration of the Provincial Government's property next year; so that with the 75 lakhs provided from the special fund our estimates include three and a half crores for relief in one way or another in Bihar. If more is needed before the end of 1934-35 it will be provided. We trust that these proposals will be regarded not only as adequate, but generous. The fact that we can make them without serious embarrassment is an illustration of the value of maintaining a sound financial policy.

APPENDIX II.

List of Officers.

(When no date is given, the officer held the post on 15th January 1934.)

I. HEADQUARTERS.

Governor	His Excellency Sir James David Sifton, K.C.S.I., K.C.I.E., I.C.S.
Executive Council	The Hon'ble Mr. J. T. Whitty, C.S.I., C.I.E., I.C.S.
	The Hon'ble Babu Nirsu Narayan Sinha.
Ministers	The Hon'ble Sir Ganesh Dutta Singh, Kt.
	The Hon'ble Mr. Saiyid Abdul Aziz.
Member of the Board of Revenue ...	The Hon'ble Mr. J. A. Hubback, C.S.I., I.C.S.
Chief Secretary	Mr. P. C. Tallents, C.S.I., C.I.E., I.C.S.
Secretary, Finance Department ...	Mr. H. C. Prior, I.C.S.
Secretary, Revenue Department ...	Mr. J. W. Houlton, I.C.S.
Secretary, Judicial Department ...	Mr. A. C. Davies, I.C.S.
Secretary, Education Department ...	Mr. S. R. Zaman, I.C.S.
Secretary, Local Self-Government Department.	Mr. W. G. Lacey, I.C.S.
Chief Engineer, Roads and Buildings ...	Mr. J. G. Powell.
Chief Engineer, Irrigation	Mr. F. A. Betterton.
Deputy Chief Engineer, Roads and Buildings.	Mr. N. G. Dunbar (from 16th July 1934).
Inspector-General of Police	Lt.-Col. A. E. J. C. McDowell.
Director of Public Instruction ...	Mr. G. E. Fawcus, C.I.E., O.B.E.
Inspector-General of Civil Hospitals ...	Col. H. C. Buckley, I.M.S.
Director of Public Health	Lt.-Col. J. A. S. Phillips, C.I.E., I.M.S. (also acted as Inspector-General of Civil Hospitals).
Director of Industries	Mr. S. Lall, I.C.S.
Director of Agriculture	Mr. D. R. Sethi.
Relief Commissioner	Mr. W. B. Brett, C.I.E., I.C.S.
Relief Engineer and Supply Officer ...	Col. F. C. Temple, C.I.E., V.D.

II. PATNA DIVISION.

Commissioner	Mr. A. P. Middleton, I.C.S.
Deputy Inspector-General of Police (Central Range).	Mr. C. T. Brett, C.I.E.
Superintending Engineer, South Bihar Circle.	Rai Bahadur K. C. Sen.
	Mr. N. G. Dunbar (from 5th February 1934 to 11th March 1934).
	Mr. S. K. Ray (from 12th March 1934).

Patna District.

District Magistrate and Collector	...	Mr. J. L. Merriman, I.C.S.
		Rai Bahadur Amarendra Nath Das (from 1st May 1934).
Additional District Magistrate	...	Khan Bahadur Muhammad Hamid.
Superintendent of Police ...	...	Mr. I. C. McNally.
District Judge	...	Rai Bahadur Shiba Priya Chatterji.
Civil Surgeon	...	Major H. M. Strickland, I.M.S.
Executive Engineer ...	...	Mr. W. G. Came.
		Mr. W. A. Garson.

Shahabad District.

District Magistrate and Collector	...	Mr. R. A. E. Williams, I.C.S.
District Judge	...	Rai Bahadur Ram Chandra Chaudhuri.
Superintendent of Police ...	...	Mr. A. C. Carter.

Gaya District.

District Magistrate and Collector	...	Rai Bahadur C. C. Mukherji, O.B.E.
District Judge	...	Mr. D. E. Reuben, I.C.S.
Superintendent of Police ...	...	Mr. S. K. Sanval.

III. Bhagalpur Division.

Commissioner	...	Mr. J. R. Dain, C.I.E., I.C.S.
		(Mr. E. R. J. R. Cousins, I.C.S., from 25th April 1934 to 17th November 1934).
Superintending Engineer ...	...	Mr. W. G. Came (from 15th March 1934).
Executive Engineer ...	...	Mr. J. Bakshi to 19th February 1934.
		Mr. J. Shaw from 20th February 1934.

Bhagalpur District.

District Magistrate and Collector	...	Mr. P. T. Mansfield, I.C.S.
		(Mr. V. E. Davies, I.C.S., from 6th April 1934.)
District Judge	...	Mr. R. B. Beevor, I.C.S.
Superintendent of Police ...	...	Mr. R. P. Wilson.
Civil Surgeon	...	Lt.-Col. A. W. Duncan, I.M.S.

Monghyr District.

District Magistrate and Collector	...	Mr. A. J. Mainwaring, C.I.E., I.C.S.
Additional District Magistrate	...	Mr. W. W. Dalziel, I.C.S. (from 31st January 1934 to 13th March 1934).
		Mr. N. Senapati, I.C.S. (from 21st March 1934 to 7th September 1934).
District Judge ...	...	Mr. W. W. Dalziel, I.C.S.
Superintendent of Police	...	Mr. W. C. Magrath.
Assistant Superintendent of Police	...	Mr. J. E. G. Churcher.
Civil Surgeon	...	Dr. B. P. Varma.
Town Engineer ...	...	Major A. G. Wheeler, from 1st April 1934.

Purnea District.

District Magistrate and Collector	...	Mr. D. P. Sinha Sharma, I.C.S. (Mr. V. K. R. Menon, I.C.S., from 16th May 1934.)
District Judge	...	Mr. A. N. Banerji.
Superintendent of Police	...	Mr. C. J. Creed.

IV. TIRHUT DIVISION.

Commissioner	...	Mr. J. E. Scott, O.B.E., I.C.S.
Additional Commissioner ...	...	Rai Bahadur C. C. Mukherji, O.B.E., from 28th April 1934 to 11th October 1934.
Deputy Inspector-General of Police, Northern Range.		Mr. E. L. Marriott, C.I.E.
Superintending Engineer ...	...	Captain G. F. Hall.
Inspector of Local Works ...	...	Rai Bahadur K. C. Sen (from 20th May 1934).

Muzaffarpur District.

District Magistrate and Collector	...	Mr. R. E. Swanzy, I.C.S.
Additional District Magistrate	...	Rai Bahadur A. K. Bose, M.B.E., from 11th March 1934 to 11th October 1934.
District Judge	...	Mr. T. Luby, I.C.S.
Superintendent of Police ...	...	Mr. C. R. B. Murray.
Executive Engineer ...	...	Mr. W. L. Murrell.
Town Engineer ...	...	Mr. O. Oliff-Lee (from 1st April 1934).
Civil Surgeon	...	Major F. H. Whyte, I.M.S.
Chairman, District Board ...	...	Babu Chandreshwar Prashad Narayan Sinha, C.I.E., M.L.C.
District Engineer ...	...	Rai Bahadur U. S. Jayaswal.
Chairman, Muzaffarpur Municipality ...		Rai Bahadur Shyam Nandan Sahay, M.L.C.

Darbhanga District.

District Magistrate and Collector	...	Mr. T. A. Freston, I.C.S.
Additional District Magistrate	...	Rai Bahadur Bhabadev Sarkar.
		Rai Bahadur Shyam Narayan Singh, O.B.E.
District Judge	...	Mr. S. Bashiruddin.
Superintendent of Police ...	...	Mr. J. E. Pearman.
Civil Surgeon	...	Lt.-Col. J. C. John, I.M.S.
Executive Engineer ...	...	Mr. C. A. Brown from 22nd February 1934 to 15th May 1934.
		Rai Sahib P. K. Mitra from 1st July 1934.
Town Engineer ...	...	Mr. B. S. Puri (from 16th April 1934).
Chairman, District Board ...	...	Maharaj Kumar Visheshvar Singh.
District Engineer ...	...	Mr. D. N. Joshi.
		Mr. M. A. Rangaswami (from 5th May 1934).
Chairman, Darbhanga Municipality	...	Babu Madhusudan Prasad Sinha.

Champaran District.

District Magistrate and Collector	...	Mr. S. L. Marwood, I.C.S.
Superintendent of Police ...	...	Mr. R. E. S. Ferguson.
Civil Surgeon	...	Major J. S. Salt.
Executive Engineer, Motihari	...	Mr. M. L. Bahl.
		Mr. C. A. Brown (from 9th August 1934).
Executive Engineer, Ramnagar	...	Mr. B. B. Gupta (from 4th April 1934).
Manager, Bettiah Wards Estate	...	Mr. J. P. J. Elmes, I.C.S.
Chairman, District Board ...	...	Babu Satru Mardan Sahi.
District Engineer ...	...	Mr. N. H. Vakil.
Chairman, Motihari Municipality	...	Babu Ganesh Prasad Sahu.
Town Engineer	...	Mr. Devi Dayal (from 16th April 1934).

Saran District.

District Magistrate and Collector	...	Mr. V. K. B. Pillai, I.C.S.
District Judge	...	Mr. S. K. Das, I.C.S.
Superintendent of Police ...	...	Mr. A. F. A. Hamid, O.B.E.
Civil Surgeon	...	Dr. Rajeshwar Prasad.
Chairman, District Board ...	...	Babu Jayadeva Narayan Sinha.
District Engineer ...	...	Rai Sahib Ram Chandra.

APPENDIX III.

His Excellency the Viceroy's Earthquake Relief Fund, Bihar and Orissa Branch.

APPENDIX III.

His Excellency the Viceroy's Earthquake Relief Fund, Bihar and Orissa Branch.

Balance sheet up to the 31st October 1934.

Receipts.	Rs. a. p.	Rs. a. p.
Receipts from His Excellency the Viceroy's Fund ...	46,60,000 0 0	
Receipts from the Mayor of Calcutta's Fund	50,000 0 0	
The Indian People's Famine Trust Fund	8,00,000 0 0	
		55,10,000 0 0
The Government of India, in reimbursement of expenditure incurred on sugar-mills ...	... ...	1,98,682 13 3
The Government of Bihar and Orissa, in reimbursement of expenditure incurred on sand clearance	... ...	3,00,000 0 0
Sale proceeds—		
Building materials ...	49,385 10 4	
Sand ploughs	426 2 0	
Sugar-mills	12,966 14 0	
Miscellaneous	2,329 4 10	
		65,107 15 2

Disbursements.	Rs. a. p.	Rs. a. p.
Charitable and rural relief—		
General	2,05,718 15 0	
Planting community ...	1,27,500 0 0	
		3,33,218 15 0
House-building grants—		
Urban	10,72,737 10 3	
Rural	14,20,859 4 7	
Middle-class	2,27,038 10 0	
		27,20,635 8 10
Grants, other than house-building, to middle classes, professional classes, etc. ...	... ...	1,62,947 11 0
Housing materials and semi-permanent shelters ...	... ...	9,30,255 13 8
Sand clearance—		
Grants for sand clearance	3,28,161 14 9	
Cost of sand clearance demonstration ...	25,929 4 9	
		3,54,091 3 6

Rents	...	...	...	...	709	2	6	Provision of sugar-mills ...	...	...	2,32,528 13 3
Refunds	...	...	...	...	35,292	7	0	Purchase of coal and maintenance of coal dumps ...	...	...	1,90,000 0 0
Sundries	...	...	...	...	5,115	2	8	Medical comforts and sanitation	...	...	40,786 9 6
								Grants-in-aid of transfer of residents from devastated areas	...	...	1,04,831 10 0
								Miscellaneous grants—			
								Clearance of wells ...	17,655 7 3		
								Cattle relief	7,196 11 9		
								Provision of boats ...	9,956 5 0		
								Fees of distressed students	683 0 0		
								Transport of relief materials, freight and incidental expenses ...	3,459 13 0		
								Sundry unclassified grants	8,149 12 6		
								Miscellaneous expenditure	1,377 2 0		
										48,478 3 6	
								Administration and postage ...	...	...	3,507 10 0
								Balances—			
								With the Honorary Treasurer	1,06,901 0 4		
								With controlling officers ...	8,77,661 1 1		
								Items in transit ...	9,063 4 6		
										9,93,625 5 11	
	Total	...	...	...	61,14,907	8	2	Total ...	...	...	61,14,907 8 2

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